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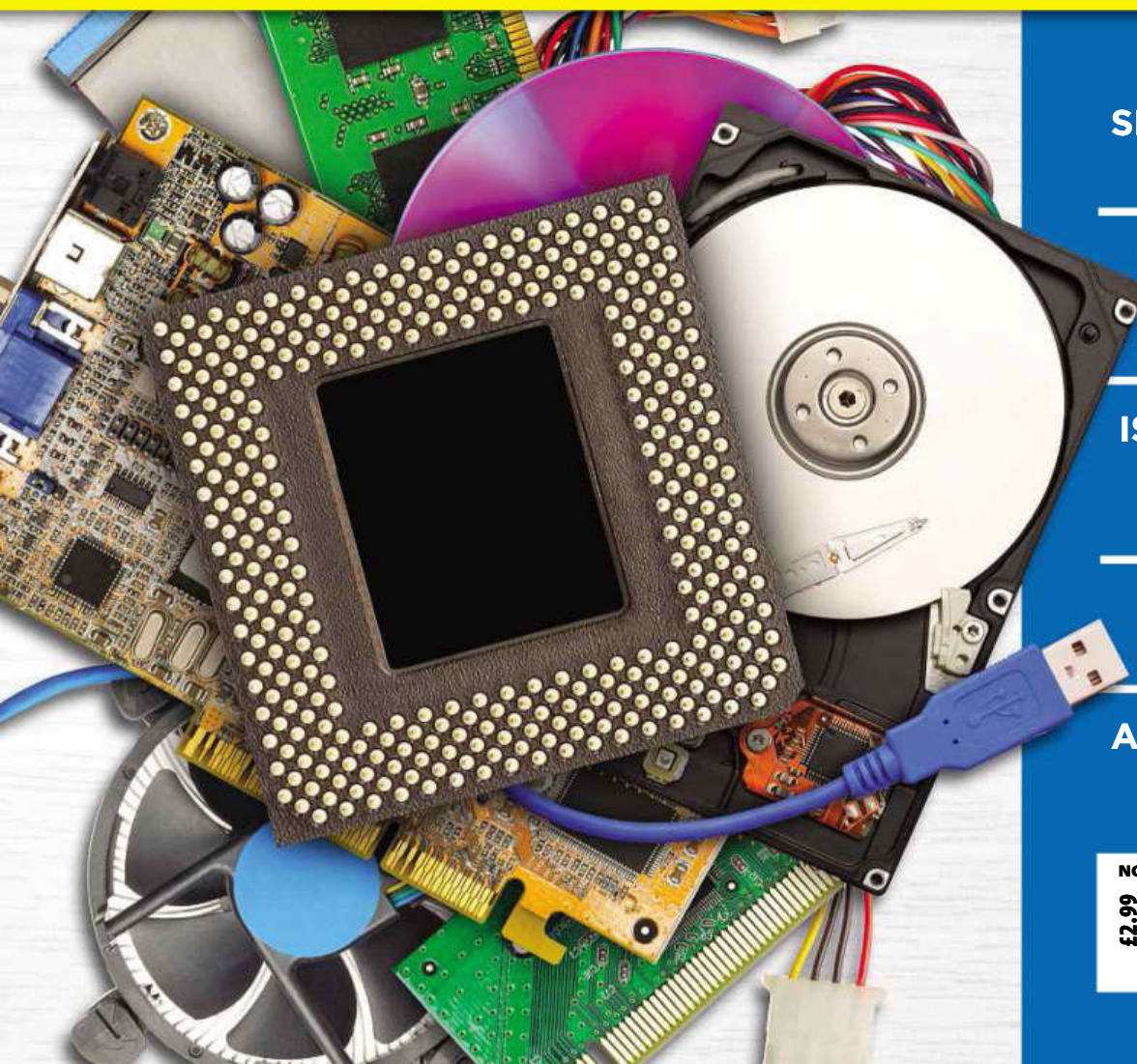
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### **08** Choosing Storage

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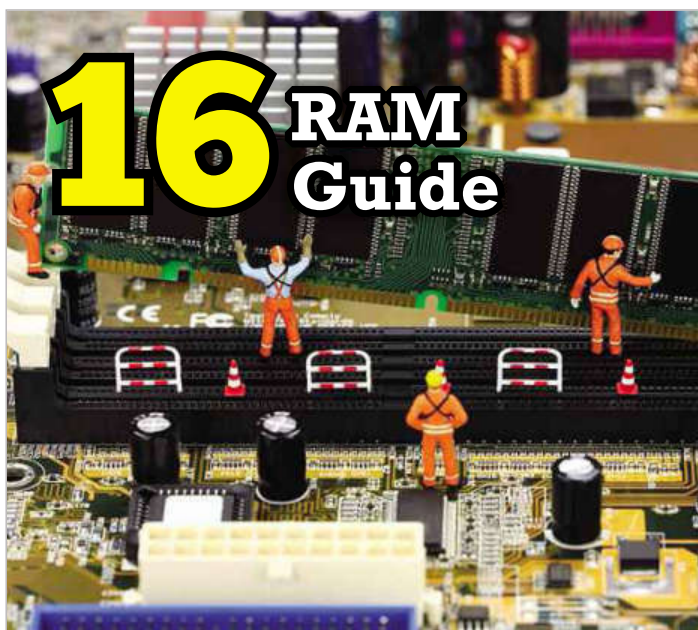
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It's not big news that the desktop processor market has shrunk in recent times, but it's a change that's hit some companies harder than others. AMD, for so long a plucky underdog, has suffered more than many, and in light of yet more losses, can it survive much longer?

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Wish that someone or something would come and tidy up your house for you? Or perhaps your lawn needs a trim, but you just can't be bothered to move? Well, if that's the case, we have just the technology to help you stay as inactive as possible. Just don't blame us if you can't get up later

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# STORAGE GUIDE

What do you need to know to get the right hard drives and SSDs?

If there's one thing computers never seem to have enough of, it's storage space. High-definition media, high-capacity optical discs and history's fastest broadband speeds mean it's easier than ever to fill up your drives. Luckily, it's also cheaper than ever to buy bigger ones. But while capacity is still important, solid-state drives have created a new avenue for upgrades – one where your storage upgrade is linked to speed, rather than size.

Standard hard disk drives are currently bigger and better value than at any point since their creation, and that makes buying one relatively easy. Any hard drive you buy today is almost certain to eclipse your current storage device in terms of capacity and speed, and it'll probably cost less while doing so.

But on the other hand, if you buy an SSD you can be sure that it probably won't be bigger than your current hard drive, but as a trade-off, there's no question it'll be faster than it. If you already have an SSD, any upgrade will probably be bigger and faster than that, such is the pace of storage evolution.

**“ Hard drives are dirt cheap, and even the largest drives on the market cost half what the best capacity SSDs do ”**

But as with all hardware, there's a big difference between buying good storage and buying great storage. And knowing how to tell what you're looking for is the best way to make sure you do the latter.

## **Mechanical Hard Drives**

Hard disk drives (HDDs) are the most common form of long-term storage for computer systems. They're sometimes called 'mechanical' hard drives to distinguish them from solid-state drives, because unlike their newer replacements, they have moving parts.

The data on hard drives is stored magnetically on rigid (hence 'hard') disk platters, which spin to allow the read head access to any particular area so it can read and write data. Although hard drives come in both 2.5" and 3.5" form factors, the latter is more common in full-size systems, and the former in laptops and portable

external hard drives. Internal drives normally use a SATA interface, though external units tend to connect over USB.

The advantages of mechanical hard drives are that their price is very low compared to their capacity. Hard drives are dirt cheap, and even the largest drives on the market cost half what the best capacity SSDs do, despite holding up to six times the data.

The benefit of this is that if you buy a new hard drive, it's normally relatively easy to transfer your stuff over and then have extra room left. Their familiarity certainly counts for something, and unlike SSDs, they rarely require you to install things like bay converters to fit them.

If you're just looking at the speeds mechanical drives can access data at, they seem nothing short of woeful compared to SSDs. A standard 7200rpm drive can transfer around 100MB/s, which is four



to five times slower than an SSD. Faster drives do exist; you may see 10,000 or even 12,000rpm drives, but even those are unlikely to transfer more than 200MB/s under optimal conditions.

It's worth noting that despite their speed deficiencies, hard drives aren't actually unfit for purpose. Most applications and operating systems are designed to work at HDD speeds, so their slowness doesn't necessarily constitute a disadvantage when running your system, but rather it's the baseline. The same is true of things like power consumption and heat output, which are higher on mechanical drives than SSDs. They're undoubtedly worse, but we're not sure they're sufficiently bad that it should worry you.

One thing that *is* a definite disadvantage for mechanical drives is their vulnerability. If a single grain of dust gets into a hard drive mechanism, it's game over for great swathes your data. A strong enough shock can physically damage the internals, and even age-related wear is a problem. There's also a lack of any warning. In many cases, the first time you know your hard drive is losing its integrity is when you try

to open a file and discover that it's no longer working.

Of course, you probably know most of this already. It's hard to imagine anyone reading this who *doesn't* have at least one hard drive in their system. But it's worth pointing out that if you're still running your main system off a mechanical drive, it's probably long past time you upgraded to an SSD. Mechanical drives still have their place as secondary storage and as the lead device in budget systems and file servers, but if you're building a general system, an SSD is the way to go.

At present, the pricing of mechanical hard drives is well beyond most people's ability to use one to capacity, meaning they represent excellent value for consumers. Although there are many manufacturers, the pricing is competitive between them, so there's very limited variation. There are limited ranges of 'premium' drives that have been engineered for increased speed, more economical power usage or reduced noise, which may skew the pricing on individual units, but in general a 1TB drive costs no more than £40.

Excluding enterprise drives, the most expensive drives on the market have a capacity of around 6TB drives. Both of them are priced around £180, meaning an incredibly low price of just 3p per gigabyte.

But whatever way you slice the pricing up, mechanical storage still costs the tiniest fraction of what solid-state storage costs. The question is down to what's worth paying for as an upgrade. We don't think £75 is an unrealistic cost for an upgrade, and that will get you a 3TB drive, and it currently represents the best value upgrade in terms of capacity.

If you can't spend that much and only need the increased space for extra storage (rather than as lead storage), then an external hard drive might make more sense.

As to whether it's worth paying more for specially engineered hard drives, we'd advise against it. Low-power, low-noise and high-fidelity drives are usually aimed at server, business or enterprise use, and their benefits tend to become apparent only if you use high numbers simultaneously. If you have money to spend on premium hardware, it's better spent buying an SSD, which will be more power-efficient, more



low-noise and more high-fidelity than any mechanical drive.

### Solid-state Drives

A solid-state drive (SSD) offers long-term data storage using flash-style memory, similar to USB thumb drives and memory cards. Most SSDs contain NAND-based memory, which is able to retain data even without an active power source – unlike RAM, which is cleared of information when it powers down.

Like modern mechanical hard drives, SSDs are compatible with SATA interfaces as well as the new SATA Express interface, which is a PCIe-compatible interface designed with SSD performance in mind. The majority of SSD drives have a 2.5" form factor, which makes them comparable in size to laptop hard drives rather than the 3.5" hard disks found in most desktop systems, but it often means that to mount them in a full-size case you may need a bay converter.

The access speeds of SSDs varies a lot between different drives depending heavily on the type of NAND they use and the memory

controller they contain, but they're much faster than mechanical hard drives across the board. Even the slowest SSD will be two or three times as fast as a mechanical drive. SSDs with the same controller tend to have very similar speeds (and controllers are often spread across multiple manufacturers), so if you're trying to find a drive faster than another, avoid those with the same controller type.

In terms of actual numbers, a modern SSD should be able to offer read/write speeds of 450MB/s with little difficulty. Anything above 500MB/s read/write is good, and 550MB/s or above is excellent. In practical terms, you're unlikely to notice massive differences between the slowest and fastest SSDs (particularly if you're used to mechanical drives!), so it can get

academic if you're a non-specialist PC user, but it can't hurt to look for the best.

SSDs have no mechanical parts, which gives them a large number of advantages over traditional, head-and-platter storage. The fact that the disk access is entirely electronic is what allows for their super-fast read/write speeds, and faster disk access means every area of computer use is sped up, from booting to loading applications to transferring files.

The lack of moving parts also means they're more resistant to physical shocks, produce virtually no audible noise when they're in use, require less electricity to run and produce less heat when they're running. In almost every way you care to mention, SSDs trump a mechanical hard drive.

**“ SSDs have no mechanical parts, which gives them a large number of advantages over traditional, head-and-platter storage ”**





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The primary disadvantage of SSDs is a fairly major issue for most people: the capacity. Or specifically, the price of the capacity. The biggest SSDs on the market barely graze a terabyte, because the price of manufacturing flash memory hardware is very high. That, in turn, makes large-capacity drives prohibitively expensive. The circumstances are slowly changing, but we're a long way off being able to buy a terabyte of solid-state storage for under £50, which is the point mechanical drives are at right now.

One of the problems caused by their lower capacity specifically applies during upgrades: if you want to clone your main drive to an SSD, there's a high probability that you'll be unable to do so, due to it being a smaller capacity drive.

Although in the past SSDs were hallmarks of high-end and enthusiast systems, it's now possible to get a 240GB SSD for less than £70, which is more than enough space to run Windows and a healthy suite of applications off.

Various factors affect the pricing of SSDs, including the provenance of the NAND memory, the capabilities of the memory controller and the age of the drive itself, so price – and the performance it represents – differs hugely from one drive to the next. At present, the largest consumer SSD drives on the market are 960GB (anything larger is probably a hybrid and should be avoided). The price varies wildly between around £230 for the oldest and slowest drive to upwards of £400 for the newer, faster models.

It's always worth researching the market to see which drives have the best benchmarks, but if in doubt, aim for the middle of the price band, and you should end up with something respectable. At the high end, you'll find enterprise drives, which are keyed for specific uses and which aren't aimed at home users. They may be drives with fast, multi-user read speeds that offer them the expense of slow single-user write speeds, for instance.

Either way, the best-value drives are currently found around the 240GB level (though 480GB

## “ One of the problems caused by their lower capacity specifically applies during upgrades ”

### Recommended Storage

In case you need a starting point, we've picked out three models of storage drive that we think represent good value for consumers. You don't have to buy these exact drives, but it should give you some idea of what we think is good and why.



### HDD Storage: Seagate ST2000DM001 (£58)

This 2TB drive from Seagate is priced incredibly cheaply, and there's no reason to be suspicious of that, because Seagate routinely produces some of the most reliable hard drives around. 2TB is enough capacity to keep all but the most extreme hoarders satisfied, and a SATA-3 interface, 7200rpm platter speed with 64MB cache means it's as fast a hard drive as you could reasonably want: 156MB/s read and write. Far below the speed of an SSD, but it's also four times the capacity for half as much money.



### SSD Storage: Crucial MX200 500GB (£126)

The MX200 is the successor to Crucial's MX100 SSD drive, which is doing pretty well for itself. Based on a Marvell 88SS9189 controller with 16nm NAND and eDrive encryption, its read/write speeds are both above 500MB/s, and its 500GB capacity is more than adequate for running a system off. Although aimed at general desktop users, it contains enterprise-style technologies such as Dynamic Write Acceleration and hardware encryption, so you can be sure your data's being looked after. At this price, it's just about affordable, and it should be noted that it's better value than its 250GB equivalent, so use this as the product by which you compare the alternatives.

drives are an increasingly good compromise between high-capacity and good value). The extreme high and low ends are always worse value than those mid-level drives.

Ultimately, if you're a data hoarder, then you may need a mechanical hard drive for storage, but at this point there's no excuse for not getting an SSD the next time you upgrade. **mm**



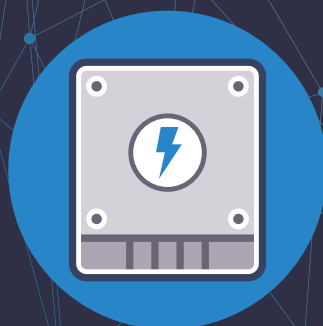


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# Should You Buy **New** Or **Old** Hardware?

James Hunt looks at whether getting the latest stuff is really necessary

**W**hen it comes to buying new components for your PC, it's tempting to look anywhere for a bargain. Buying new hardware might give you the thrill of being the first person to handle it out of the box, but do you also pay a premium for that privilege? Could you save money by buying older or even second-hand components instead?

Unfortunately, there's no single answer to this. Unlike cars, which lose 40% of their value in the first year that someone owns them, some computer parts are valuable for years after you pick them up. Others are much quicker to depreciate. Sometimes the latest hardware is only slightly better than the older stuff. Other times it's much worse.

How can you tell the difference? Luckily, we can tell you.

## **CPUs**

Processors retain their value quite well on the secondary market, which perhaps reflects the high demand there is for fast processors, even if they're used or out of date. Case in point: the Sandy Bridge Intel Core i5-2500K is now getting on for four years old but routinely sells for around 60% of its original value, even second hand. Evidently, even though the Sandy Bridge platform has been long deprecated and replaced several times, there's a large audience for those chips.





Of course, that doesn't mean you should actually buy one unless you can get it from a trusted source. CPUs are very fragile, and there's no way of knowing whether it's been overclocked to within minutes of death or only used by a kindly old lady who checked her email once a week. For the sums you have to spend, we'd advise caution. Or, at the very least, asking for a healthy returns policy.

When it comes to CPUs, you should pretty much always buy the newest you can afford. Older chips don't lose their retail value even when a new one comes out, so you have to shuffle back several generations to make any immediate saving, and ultimately the shorter lifespan of the hardware will make that a false economy anyway.

### Storage

Like processors, it's impossible to know what amount of stress mechanical hard drives have been under before you buy

them, but unlike CPUs, it's hard to really trash a drive without it being apparent long before actual failure occurs. We're not sure we'd run our system off a second-hand hard drive, but if you just need to expand your storage in a non-critical way, you can make huge savings. Second-hand and open-box 1TB drives go for around £20, which is at least 50% off retail.

SSDs are less predictable in their pricing habits. You can make a saving by picking them up second hand and – in theory, at least – there shouldn't be any danger in doing so. No moving parts means that SSDs are much less prone to damage and failure than mechanical drives (though some models are prone to high failure rates, so do your research!). But coupled with their inherent desirability, their generally consistent performance means they retain their value quite well.

### GPUs

Graphics cards are one place where you can really clean up by buying second hand. There are people out there who like to stay on the bleeding edge of graphics technology, which means that the market receives a fairly good churn of used-but-near-pristine graphics cards. Like processors, it's hard to tell if they've been pushed beyond their factory specs – but unlike CPUs, if one goes down in flames (literal or metaphorical), the only cost on top of the money you spend is your ability to play games, rather than the ability to use your PC at all.

Buy a second-hand current-gen card, and you'll be able to shave anywhere from 20% to 50% off the price depending on how lucky you are. By contrast, buying previous-gen hardware is hard to do, not least because manufacturers often re-release it under a new model number that makes it look new.

Unless you're a particularly hardcore gamer, we're almost inclined to suggest that buying graphics cards second-hand is actually the best way to do it. GPU failure rates are very low, and the considerable majority of GPUs are replaced because they can't keep up with software demands well before they wear out. All it takes is a can of compressed air to blow the cobwebs out and you could have a piece of hardware that looks like new and performs more or less the same way too.

### RAM

New RAM is so cheap that buying second hand seems like it wouldn't be worth doing, but second-hand sticks of RAM are

so cheap that it's hard not to turn your head a little when you see the prices. Two 2GB sticks of generic DDR3 RAM costs £35 to £40. You can pick up the same thing for less than £10 second hand.

The main reason second-hand RAM comes so cheaply is that there's a lot of it about. RAM's low price and reasonably high impact on performance mean it's always a prime candidate to upgrade and replace. The newest generation of RAM modules are only just creeping out, and that means DDR3 is going even cheaper, having been around for the better part of a decade. It'll be a couple of years before DDR4 becomes anything like the standard for most systems, so whatever DDR3 you buy now should take you through to that next big upgrade without much trouble.

It may, therefore, be worth taking a punt on second-hand RAM if you're really trying to save. You don't stand to lose a lot of money if anything goes wrong, and it's easy to identify faulty RAM with a simple memory test.

### Other Peripherals

If you're after any peripheral not mentioned here, there's good news: once you move beyond the core system components, there are bargains to be found everywhere. Computer fairs practically give away things like mice, keyboards and network cards. Monitors retain a lot of their value but not all of it, and are easy to pick up in working order. Speakers, printers, even optical drives: they're all easy to find at cheaper prices than buying new.

Better still, you can buy most of these components without worry. A bad network card never did anyone more harm than inconvenience, whereas if your second-hand hard drive or RAM fails, you could potentially lose important data.

Similarly, most of these components don't change in any great technical sense from one iteration to another. A Wireless AC card might be faster than a Wireless N card, but when the latter costs 20 times less than the former (priced, as many are, at a single pound), it's probably worth the short-term saving. It's not like upgrading further down the line isn't easy.

In short, when you're looking for second-hand or last-gen components, make sure you know what's important to you. We don't gamble with the big stuff – our main storage drive and our CPU – but as far as we're concerned, everything else is up for grabs. [mm](#)





# RAM GUIDE

## How to pick memory that will truly make a difference

If there's one thing a computer can almost always use more of, it's RAM. Offering boosted application speeds, smoother visuals and shorter boot times, adding RAM is one of the best ways to give your computer a general performance boost beyond adding a new processor. Indeed, in a fair number of cases, a RAM upgrade might even lead to more tangible improvements than a new CPU, since the visible effects of additional RAM are most apparent when performing some of the least CPU-intensive tasks, such as web-browsing and multitasking.

Today, any computer owner running Windows 10 should expect to have at least 4GB of RAM in their system (the minimum is 1GB and the recommended is 2GB, but we think both of those amounts are very optimistic). If you're a gamers, an enthusiast or any other kind of heavy PC user, you can be justified in aiming for two or even four times that amount. At present, the best consumer platforms support up to 64GB of RAM, but that, at least, is vastly more than any home user would realistically need.

But as useful as RAM is, making the choices that get you the right

RAM can be much harder. That's why we've put together this guide to help you pick the right RAM for your system, whatever you want to use it for.

### What To Look For

The first question you have to answer is whether you're looking for DDR3 or DDR4 RAM. If you're upgrading an existing system, then there's almost no chance of it being DDR4, because this latest iteration of RAM has only just gone on sale. However, if you're buying a system new, you may want to consider outfitting it with the latest technology, not least because any DDR4 modules you buy now will potentially be reusable in the next system you buy, which will almost certainly run on the newer RAM technology.

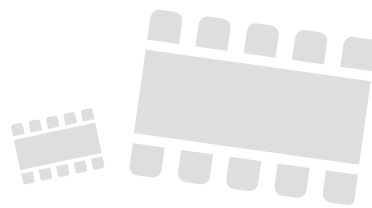
However, because it's newer and higher performance, DDR4 memory is also more expensive than DDR3. Crucially, it's not compatible with a lot of older systems. If you're buying a new core system, you'll have to get an Intel Skylake CPU and compatible motherboard to run DDR4 RAM, while even the latest AMD systems currently still use DDR3.

Whether you buy DDR3 or DDR4, there are a few types of rating you'll see applied to memory modules, which are there to define their performance. Remember that in the same way CPUs are rated at certain speeds but can be run at faster ones, the RAM values given are merely the speeds at which the hardware is rated. In a real-world situation, they may come in a little slower than stated or continue to operate normally even when overclocked to substantially faster speeds.

Overall RAM speed is a combination of various factors, including latency, clock frequency and transfer rates. Latency values are given as a 'CL' number (e.g. CL9 or CL15), and lower numbers describe quicker communication between the RAM and the CPU. Clock frequencies are given in the more familiar megahertz value. As with CPUs, higher is better; anywhere between 1333MHz and 2133MHz is acceptable, but performance RAM may be rated as high as 3300MHz. Transfer rates are given in MB/s, using codes such as 'PC3-10666', which when translated tells you that this is DDR3 RAM







capable of transferring data at a rate of 10,666MB/s. Again, higher numbers here are better.

Some memory supports Intel's 'XMP' technology, which is a proprietary memory overclocking profile found in certain platforms. This technology allows the motherboard to clock the RAM at its optimum speeds without any in-depth user tweaking required, which makes overclocking a far less risky process. You'll find it in most modules, so you shouldn't worry too much about whether it's included. If you're buying cheap RAM where it isn't, you probably don't have the sort of system that would benefit from it anyway!

### DDR3 Vs DDR4

Although we touched on it briefly, there are lots of differences between DDR3 and DDR4 that are worth taking into account when you're looking to buy RAM.

As with previous RAM iterations, DDR4 modules are not compatible with any earlier versions due to a variety of factors. Different signalling voltage is one of the biggest, but in any case the modules have a different physical interface to prevent any confusion. If you plan to use DDR4, any of your existing DDR3 modules are going to have to go straight in the bin (or possibly somewhere more productive).

The majority of improvements in DDR4 are related to its speed, and its faster clock frequencies will allow greater data transfer rates. DDR3 modules only officially support speeds up to 2133MHz, while DDR4 modules will start at 2133MHz and be rated up to 4266MHz.

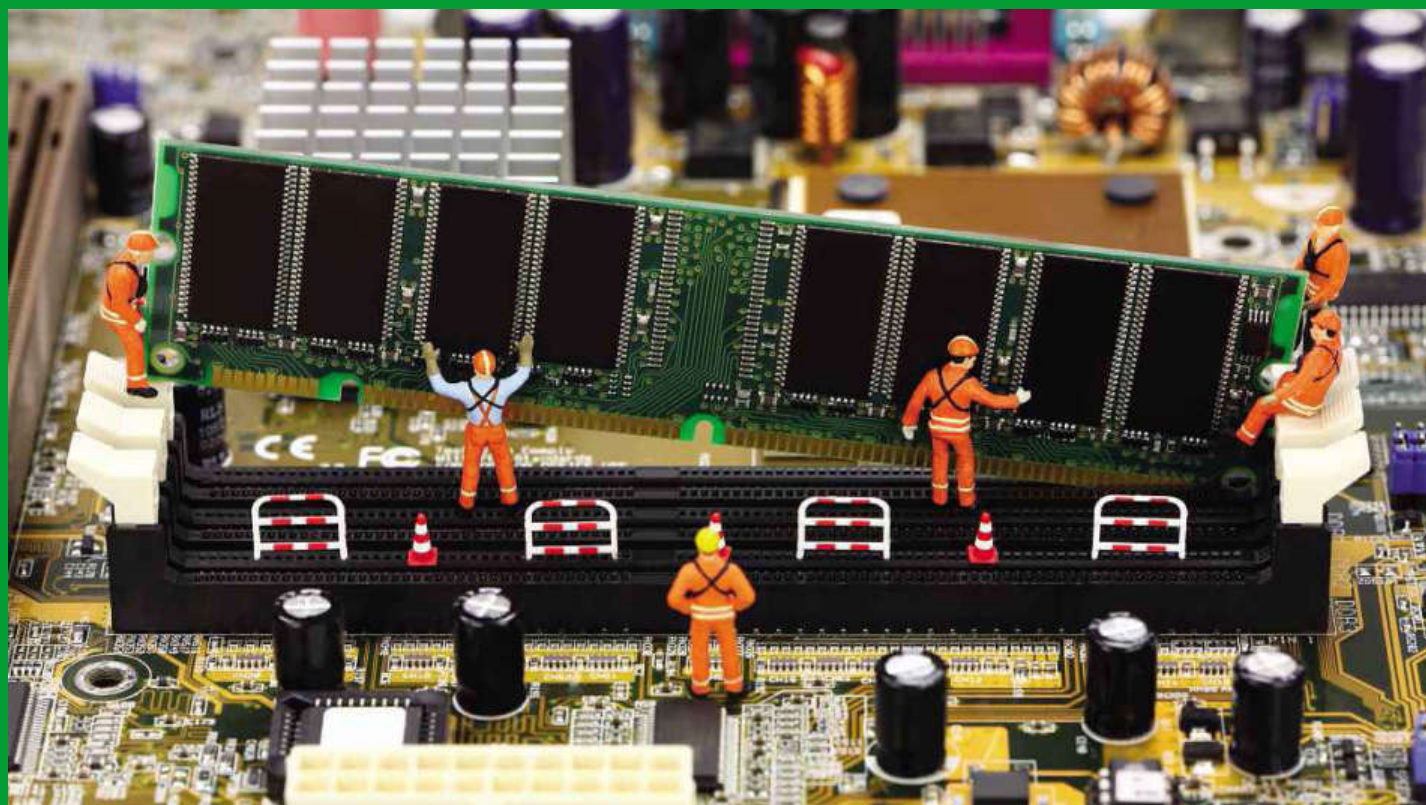
In addition to this, the power usage of DDR4 is lower, because the modules run at a lower voltage – 1.05-1.2 volts, compared to 1.2-1.65 volts for DDR3. Lower power usage means better battery

life for mobile devices, as well as cheaper energy bills and less heat inside a system – good news all round. DDR4 also supports a new technology called 'Deep Power Down', which means it can use near-zero power when in sleep mode, since no refresh is required. It also has the ability to refresh individual chips on a DIMM, rather than the whole DIMM, which can improve latency.

DDR4's improved speeds mean it can also have greater capacity modules. Manufacturers have already proven that they can make 128GB DDR4 module based on a 20nm process. DDR4 modules tend to offer 8GB to 16GB per stick, thanks to higher-density chips, whereas DDR3 averages half that.

In terms of physical appearance, DDR4 modules will contain more chips than DDR3 and have more pins on the connector (284 versus 240) but are the same length, because the pins are closer together. The new modules will be taller than DDR3, but by less than a millimetre (31.25mm, compared to DDR3's 30.35mm), and thicker than existing modules by 0.2mm to allow for more signal layers. As for the SO-DIMM variants found

“ The majority of improvements in DDR4 are related to its speed ”



in notebooks and other low-space/portable devices, they have 256 pins (rather than 204) and are 1mm thicker, but have the same length and height.

## Pricing

When choosing memory for a PC, pricing is one area that might leave you initially confused. Why should you pay £80 for an 8GB stick of memory if you can pick up exactly the same amount from another manufacturer for only £40? The difference between affordable or inexpensive RAM and high-end, costly performance RAM can be summed up quite succinctly using two simple words: quality control.

If you choose to buy the cheapest sticks available, the best possible outcome is that when you install them, they'll work with no problems and at their listed speeds. The things is, even that's not guaranteed to happen. So-called 'value' RAM is taken from batches that are more likely to have manufacturing errors that will become evident soon after purchase. Indeed, even when this RAM works, it has a greater probability of running at lower speeds than it was rated at under benchmark conditions.

If you're building a gaming PC, it's also worth remembering that basic RAM will prove far less hardy when it comes to overclocking – not just because the quality of the materials and manufacturing will be lower, but because it won't have any extra cooling features, like a heat spreader or fan attachment to keep it running at its optimum temperature.

We should acknowledge that it is entirely possible to save money by buying cheaper RAM without completely crippling your PC. The effects of memory speed on gaming are negligible compared to most other components, and even if your RAM does turn out to be full of errors when you receive it, you'll be entitled to an immediate replacement. It's only a small gamble.

The question of how much you should pay is hard to answer, though. Cheap and low-capacity RAM modules are actually quite bad value compared to the mid-range, but high-end RAM doesn't offer the

## Recommended RAM Models

Even when you have the information to hand, buying RAM can be a daunting and confusing process. In case you're still not sure where to get started, we've put together this quick guide to the best RAM offers you can get depending on what your budget is. We're looking exclusively at single DIMMs for ease of comparison, but remember that you can usually save around 5% by buying a double-DIMM kit instead of two individual sticks!



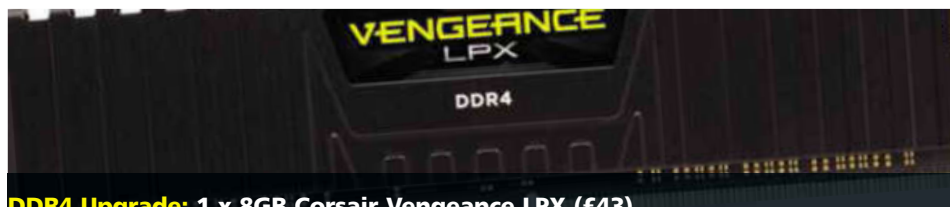
### Budget Upgrade: 1 x 4GB HyperX Fury (£18)

If you're trying to improve an existing system, an extra 4GB stick of memory should be enough to whip your operating system back into shape. This 1333MHz RAM isn't the fastest around, but unless you're running a very recent-generation system it's still going to be rated faster than your system needs. CL9 latency is good at this end of the market, and the fact that it costs less than £20 means it's competing with value RAM, even though it's significantly better than that. It does, after all, have shielding. It looks good, it performs well, and it's priced brilliantly. If we were going to upgrade a system's memory capacity in anticipation of installing Windows 10 on it, this is where we'd start.



### Gaming Upgrade: 1 x 4GB Crucial Ballistix Tactical Tracer (£25)

If there's any doubt that this was gaming RAM, you only have to look at the name, but looking at the specs should work too. 1600MHz isn't the fastest it could be, but unless you're a committed overclocker it's fast enough. CL8 latency is a much more important stat than the clock frequency, and PC3-12800 bandwidth is more than good enough for gaming. What makes this RAM particularly good for gamers, though, are the built-in LEDs and the thermal sensor, which allows you to track the temperature of your RAM in real time. We won't lie and say it's the best RAM on the market, but when it comes to gaming, it's some of the best-value.



### DDR4 Upgrade: 1 x 8GB Corsair Vengeance LPX (£43)

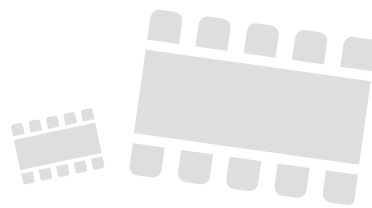
If you're buying DDR4 memory, it's clear you want to be on the cutting edge of computing, and these modules reflect that. Designed for high-performance overclocking with a pure aluminium heat spreader, they can be pushed well beyond their specs and keep going. XMP 2.0 support is included, and their low-profile design allows them to take up as little space in your system as possible. The specs are solid for DDR4 modules: 2666MHz clock speed, CL16 latency and PC4-21300 bandwidth. Corsair is an ideal brand for performance gamers, and anyone building a new system should be pleased to have their hardware to hand. Although a pair of these would be ideal, even one will do for running most games and Windows should have no problem running on 8GB at all. If you find better, get it, but we're not so sure you will.

sort of improvements most users would actually notice.

But to talk specifics, for one 4GB DDR3 module, you should probably be spending around £15 to £20 on an average system. The bottom end of

that range is the cheapest stuff you'll find, and the top end is the good-value stuff. Anything north of that is probably overpriced for all except the most powerful gaming systems, but especially once you go past £30 a stick.





## “ So how much RAM do you need? It depends on what you want to do with your system ”

Meanwhile, if you're looking at buying DDR4, then there aren't many options to choose from, but an 8GB DIMM should cost between £40 and £50, and anything more expensive than £55 is either overpriced or aimed at super-high performance systems.

### How Much RAM Do You Need?

The average consumer motherboard contains four memory banks, giving you the chance to have up to 32GB if you stick to 8GB DDR3 DIMMs, and 64GB if you use 16GB DDR4 DIMMs. But is that the amount you should be aiming for?

For the most part, adding RAM beyond a certain point is unnecessary. The question is where that point is. Adding 2GB of RAM to a 2GB system has the most dramatic effect, giving you a 10%

reduction in app loading times. A further 4GB (so the system totals 8GB) should reduce app loading times by a further 5% or there about. Beyond that point, you'll see only very small improvements even though the RAM costs the same amount.

We should note that those numbers apply to application loading and multi-tasking. Games don't necessarily use RAM the same way. Most games don't actually require huge amounts of RAM, because a large proportion of their memory requirement is used for visual elements, particularly textures, which are loaded into the video memory. Games also tend to be the only major task while you're running them, so the overall system requirements aren't high either.

Again, to give hard numbers, if you upgrade from 2GB of RAM to

4GB, you'll probably see around a 15% increase in frame-rates at full HD. If you upgrade from 4GB of RAM to 8GB, you're likely to see much smaller performance improvements – maybe another 5% improvement in full HD frame-rates. If you already have 8GB and you upgrade further, you'll see virtually no improvement, especially if you're using a mechanical hard drive, which bottlenecks the RAM throughput.

So how much RAM do you need? It depends on what you want to do with your system, but if you're a non-specialist user and/or light gamer, we'd suggest that you keep your system around 8GB. At worst, that gives you room to grow if things change in the future.

And they might well do that. 4K video and media-heavy web pages mean systems need more RAM than ever. So if you're building or upgrading a system today, be aware that while stuffing it full of RAM might not yield much extra performance today, it's definitely a good way to prepare for the demands of tomorrow. [mm](#)



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# Do You **Need** An **Expensive Case**?

We take some of the guesswork out of choosing the right chassis

**W**hen you're trying to build a system, finding the best bargains can take a lot of research. You have to compare price and performance, as well as considering the economy of what you need now against what will be cheaper to buy in the future.

Few of us have an unlimited budget for building a PC, and when the time comes to start shaving the pounds off components, the case is probably the first place people look. After all, it's not like it actively does anything, right?

But if that's true, then what are all those expensive cases actually charging money for? Are they really selling themselves on their cosmetics, or can having a high-end case actually help your system's performance?

## **For**

There's an argument that getting miserly when it comes to buying a case doesn't

**“ Standard cases are little more than metal boxes ”**

make much sense, given how much you may have spent on computer hardware. After all, a good case – a *really* good one – might remain in use for decades to come. The obvious counter-argument is that so would a bad one, but then if you're going to be stuck with the same case for a decade, shouldn't it actually be a good one?

The benefits of a high-end case run through several different areas of your PC experience. For a start, a good case tends to have a lot of room inside. That means you'll never find yourself running out of space for upgrades – something that's a very real possibility with smaller and low-end cases. Furthermore, the extra

space allows air to circulate and heat to dissipate, which feeds into the true benefit of high-end cases: they're better at cooling.

Standard cases are little more than metal boxes, but premium and gaming cases tend to have built-in vents, more cooling mounts, better cable management features and less internal kibble, all of which feeds into keeping the air inside as fluid and low-temperature as possible. Low-temperature components have a longer lifespan and give better performance than those that are allowed to heat up, so your money doesn't just get you more toys to notionally play with; it gets you genuinely better performance.



High-end cases are also designed with respect to users who like tinkering with their hardware as well. You won't find tool-free fixtures and hot-swappable drive bays in just any case. If you're the sort of person who cracks their PC open every couple of weeks to try out a new tweak or install some new hardware, a decent case is going to significantly reduce the amount of effort you expend on the tedious practicalities and let you get straight to the good stuff.

Even noise can be reduced. More expensive cases are more likely to be better-engineered, reducing the chance of components rattling, and they're more likely to have noise-absorption features built in. Elsewhere, a dust-tray might allow you to clear out the fur that settles in every case without getting on your hands and knees with a washcloth. Internal edges will be smoothed off so you can't slice your finger open on them. It's details like this that make high-end cases worth considering for anyone familiar with their PCs internals.

And all of that doesn't even touch on the things that gaming cases are most known for: their looks. If you want your system to have a truly impressive appearance, no £30 case is going to give that to you, no matter how attractive its price. If you want a system that looks as powerful as you've made it, you need a case that demands a proportionate amount of money.

But before you go out and spend your money, let's also look at the other side of this answer...

### Against

So here's the thing: you don't actually need a case at all. One of the best ways to keep your PC cool is to simply remove a side panel, giving air more than enough room to circulate. Many a kitbashing maverick on the internet has set up their PC to run inside a cardboard box, lunchbox or fridge. It's not like there isn't significant leeway when the time comes to enclose your PC in something. You might care what it goes in, but your PC certainly doesn't.

For the most part, cases are just a convenient way to keep your PC components from getting tangled up with one another. After all, they have the right framework to support standard components, and the screw holes have already been drilled. Strictly speaking,

the most useful function they perform is that they keep dust and debris away from your hardware, you away from some potentially shocking electrical incidents, and your delicate components away from heavy household items that could quite easily shatter them into dust.

But most of us don't have the time or willpower to spend the start of every day cleaning the dust off our hardware, nor the daring required to run several hundred pounds of hardware in an unconventional setting, so the reality is that you probably do need a case of some kind. But once you've accepted that premise, what's the difference between a cheap case and a REALLY good case?

In performance terms, maybe a degree or two. Unless you're running your system on an overclocked knife-edge, your case isn't going to be the difference between life and death for your system. Sure, cooler is always better when it comes to computer hardware, but in practical terms the small shift in temperature isn't going to dramatically extend your components' lifespans.

But even though there is some tiny performance gain to be had from a case, the reality is that most of what you get are features designed for convenience and ease of use. If you don't take your PC to bits fairly often, then all the smooth edges and tool-free fittings aren't going to matter.

Likewise, no amount of cosmetic value will improve your experience if you're the only person who ever sees your system. There's a reason high-end gaming

cases are designed to look as impressive as possible, and it's because they're supposed to intimidate and impress those you play against at LAN parties and gaming events – something that isn't a concern for the vast majority of users.

But the biggest difference between a high-end case and a low-end case is, of course, the money. And that's something most high-end cases can't ever justify to a user that's on the fence. When you're on a budget, turning pounds into performance is the most important thing, and cases are the worst way to do that.

Ploughing £100 into a case won't reap the kind of improvements you could get by spending £100 on a faster processor, better graphics or bigger SSD. Cases are down there with PSUs and fans for providing the most marginal improvements for every extra pound you spend. And ultimately, that's what keeps the high-end versions from being attractive to anyone other than the most enthusiastic system-builders.

### So Which Is It?

As you can see, it heavily depends on what type of user you are and whether you have the money to spare. For the most part, cases that cost more than £50 to £70 are far beyond what most of us will benefit from.

That isn't to say you should turn one down if it's offered, but understand that high-end cases are the height of frivolity when it comes to upgrading a system. You may be okay with that, but if you are, you're probably in the minority. **mm**





# PSU Guide

There's more to getting the right power supply than just picking the one with the highest number

**P**ower supply units (PSUs) are an essential component of any computer for what should be fairly obvious reasons. Most of us don't waste a second thought on our power supplies for the majority of the time we use our PCs, but when the time comes to buy a new one, you'll find that PSUs are as complex and varied as any other computer component and just as deserving of the proper attention.

In case you suddenly find yourself thrust into a potentially confusing world of wattages, efficiencies, amps, volts and rails, we're here to help. But fair warning: if you're not building a performance or gaming system, some of this information will be of no practical value. If you are, though, it's required knowledge. Either way, you might find it useful to know.

## What To Look For

The most basic thing you need to know about PSUs is that they all have a wattage rating, which tells you how much power they can deliver to your system. All components in a system draw a certain

amount of wattage, which is taken from the total available. A hard drive might need around 15 to 30W, and a graphics card might need as much as 300W at its peak. If all of the components in your system add up to more than the maximum wattage of your PSU, it won't function, and you'll have to install a more powerful one.

At least, that's the basic version of that information. This is where things get a little tricky, because not all PSUs are created equal. All PSUs are, to some extent, inefficient. This means that some proportion of their wattage is converted into heat energy before it can power anything. Some particularly cheap PSUs have been reported as losing up to 150 to 200W of their capacity to heat, meaning that the 600W rating might actually only provide a 400W supply.

As a result, you need to make sure that your PSU has a decent overhead compared to what you actually need. You can check using online power calculators what the rough draw of your system's configuration is, and then you should buy a PSU with a

big enough overhead to account for the base inefficiency and the gradual aging of the components, which will also reduce its capacity to deliver power. PSUs are usually engineered to work best at around 60% capacity, so use that value as your target.

Annoyingly, it's hard to know what a PSU's efficiency is like without testing it, so the good news is that there's a certification system set up, which will tell you quite how efficient a PSU is. The 80 Plus certification ensures that a PSU is delivering at least 80% of its wattage as usable power, and various tiers of award through bronze, silver, gold, platinum and titanium can ensure that your PSU is anything up to 90% efficient in all circumstances. Look for the logo on the box!

You should also take care to check that a power supply has the right connections. Most come with adaptors to help you choose the right configuration of plugs based on the varying technologies in your system (e.g. Molex three-pin, Molex four-pin, SATA, etc.), but if you have a high-end graphics card that requires a separate power supply, make sure you also have the six- and eight-pin connections they need to draw power!



## “ Consumer-oriented PSUs cover a rather insane price range ”

### Specific Models

If you're looking for a PSU, we'd recommend the following hardware:

#### Corsair V2 CX Series (£34)

This 430W 80 Plus Bronze-rated PSU is ideal for any low-to-medium power system. With a 32 amp 12V rail, 120mm silent cooling fan and master power switch, it has everything the PC-building enthusiast needs at a price that's neither worryingly cheap or upsettingly expensive.

#### EVGA Supernova NEX650G (£75)

Rated 80 Plus Gold, this 650W PSU has a 53 amp 12V rail, 135mm silent fan and four PCIe connectors, so it's perfect for multi-card and high-demand systems. It's expensive, but not unreasonably so for a modular system with these capabilities.

#### Coolermaster Vanguard (£160)

PSU prices can quickly get crazy, but sometimes that's exactly what you want. This fully modular 1000W PSU has eight PCIe connectors, a 135mm fan and a 12V rail capable of reaching 83 amps, so there's no doubt that it's got some serious chops. Do you need it? Well, maybe not. But if you have the money burning a hole in your pocket...

which ensures that power is 'clean', which is to say delivered consistently, leading to a more reliable supply of power and thus a more stable system. It's probably only relevant to those overclocking their systems who have very tight margins for error, but it's worth knowing about just in case.

### 12V Rails Explained

If you're running high-end graphics or even a multi-card system, then bad news: wattage and efficiency aren't all you have to worry about. You also have to pay attention to the amperage values of a power supply. Internally, PSUs divide their supply into different 'rails' with different voltage values. The 12V rail runs the most power-heavy components, such as the CPU and GPU, while the 5V and 3V rails power less electricity-hungry components. If your PSU has a low amp rating on the 12V rail, it doesn't matter how many watts it is; it could still fail to power high-end graphics cards.

Companies will usually list the amperage value of the 12V rail on the PSU itself, and probably on the box, but if you want to check it out for yourself, you can do a little maths. Amps is watts divided by volts, so check how many watts are on the 12V rail, divide it by 12, and there's your amps value.

Generally speaking, if you spend enough money on a PSU, this won't be a problem,

but if you're putting together a particularly demanding system, it's worth a quick check just to make sure!

### Pricing

Consumer-oriented PSUs cover a rather insane price range, starting at about £10-£15 for the cheapest and topping out at a borderline-ludicrous £250. It goes without saying that the cheap models should be avoided except for the most basic, short-term computing. It's simply not worth the risk to your components to run on one.

However, you can find good-quality 500W power supplies as low as £35. They'll be short on extras and may have trouble if paired with the highest-end graphics cards and can't really be used in SLI/CrossFireX systems, but for non-gaming machines they should more than suffice. If you're spending more than £50 and don't have a powerful graphics card or other high-power component, ask yourself why.

If you are building a gaming system, though, we'd recommend budgeting £60 to £80 for a PSU. At this price, gaming PSUs come with things like lighting accessories and high efficiency ratings. You may want to spend more for extras like modular designs or ultra-quiet fans, but once you go beyond this range, you're firmly into enthusiast territory – at which point, the sky's the limit! [mm](#)



So-called 'modular' PSUs allow you to plug in only the cables you need at any given time (in most PSUs, unused cables simply hang loose). Modular PSUs mean more space to manoeuvre inside your case, but they also mean greater air flow and thus, you could argue, translate to a slight performance increase. You'll pay extra for the technology, but it's really down to personal preference whether you want it. It might sway a decision, but there's no reason to base one on its inclusion.

If you see 'DSP' mentioned, this stands for 'Digital Signal Processor', a technology

# Network Card

## BUYER'S GUIDE



Give your network a speed boost with one of these simple upgrades

**V**irtually every modern PC needs wi-fi connectivity, and if you're building a desktop system, then the best way to get it is by far is to use a network card. PCI network cards are more expensive than USB adaptors, but they're also more powerful and more reliable, which means your PC runs smoother and your network runs faster.

If you've never bought a network card before or are replacing a particularly old one, knowing what to look for can be difficult. That's why we've put together this guide to buying network cards. That way, next time you choose a wireless adaptor, you can make sure you get the right one for your needs and budget.

### What To Look For

Before you start looking for a network card, it's important to understand that the market as a whole is divided into several categories.

USB network adaptors are wireless dongles that plug into a USB port. PCI network adaptors are cards that can be seated on the motherboard of a full-size system. USB adaptors are mainly software-based, and PCI adaptors are mainly hardware-based, but it's important to understand that it's not always the case. If you're looking for an internal card, you should be planning to buy one that does its processing in hardware.

But why? It's mainly a performance issue. Software-based adaptors are minimalist pieces of hardware, which contain little more than an interface between the antenna and your system. The actual processing of the signal is done on your CPU. Instead of actually having the hardware necessary to process the network signal, software adaptors replicate the functionality of the chips they lack in software – kind of like running an emulator of an old games console.

This approach has its benefits, of course. Such devices are cheaper to manufacture and buy. The lack of solid hardware means they can be fitted into incredibly compact packages. And you can easily transfer them from one system to another.

**“ Whether you get a Wireless N or a Wireless AC card, it's worth noting that they may have support for multiple bands ”**

But software adaptors are also a drain on your system's resources. They take up CPU time that could be spent on playing a game or encoding video. If you're a performance enthusiast or hardcore gamer, you may not want to relinquish some of your processor's precious resources to something that could be done better by other components if you pay a little extra. Similarly, if your system's on a performance knife edge, you might prefer that it doesn't have to ringfence a certain amount of its capabilities for networking.

This is where hardware adaptors excel. They're much bulkier than software adaptors and typically fit in expansion ports rather than USB sockets. They're also more efficient and far less of a burden on a system, because these more expensive pieces of hardware contain the chips and components that analyse and process your network signal directly, meaning they make less use of the CPU and give a faster, smoother experience all round.

The downside is that they cost more, are less simple to install and can't be easily moved from computer to computer, but that's the price you pay for performance. But it's only a relative expense (no more than £10 to £20 difference in most cases), so you might find it worth paying for in the long term.

If you decide to go for an internal card, the only thing you have to learn is how to spot a software adaptor that has simply



been placed on a PCI card. Such hardware is considerably more slight than the proper stuff, so you can mostly tell by sight alone.

## Wireless Standards

Whichever type of card you buy, you should make sure it supports the latest standards. Although it isn't completely out of the question to buy a Wireless N card, it's worth noting the Wireless AC is fast becoming the popular standard. Wireless AC hubs are compatible with Wireless N hardware (and vice versa), so unless you're really trying to save money, a Wireless AC card is the way to go.

Whether you get a Wireless N or a Wireless AC card, it's worth noting that they may have support for multiple bands. Single-band cards establish just one connection, which limits their speed. Single-band Wireless N can have a connection speed up to 150Mbps, and standard wireless AC (which is actually dual-band by default: one single-band wireless N connection and one single-band wireless AC connection) is a much faster 433Mbps. Both support multiple simultaneous connections though, so you can get wireless N hardware that supports up to 900Mbps and Wireless AC hardware that supports up to 3200Mbps, but they might not reach those speeds outside of laboratory condition.

In the past, different network speeds used to involve a trade-off between performance, speed and reliability, but Wireless AC's specification required that routers running Wireless AC access points also run a Wireless N access point too, and since the adaptors are compatible with both, there are no drawbacks to this. Unless you really need to save money, a Wireless AC card will give you everything a Wireless N card does and more on top.

## Pricing

Wireless adaptors are some of the cheapest hardware you can buy, but it's worth noting that there's a significant price difference between the cheapest USB wireless adaptor and the full-size network cards we're advocating. USB adaptors can be picked up for as little as £6, and cheap, software-focused network cards for under £15.



## Specific Models

If you're looking for a PCI wireless network card, we'd recommend the following hardware:

### TP-Link TL-WN851ND (£18)

There are cheaper Wireless N cards on the market, but this dual-band Wireless N300 ensures fast, reliable connections even if your network only supports the older standard. It's not exactly brimming with features, but it's a solid last-gen performer, and unless you want to spend a lot more, no other Wireless N card is likely to be significantly better.

### Asus PCE-AC56 (£33)

This dual-band card runs Wireless AC connections at a solid 1.3Gbps. An on-board heatsink ensures reliability and stability, and the dual antenna design offers excellent coverage even if signals are weak. At this price, we can't see why you wouldn't buy it!

### Asus PCE-AC68 (£63)

It's a tad too expensive for its own good, but if you want the absolute cream of the Wireless AC crop, the PCE-AC68 should oblige. Its triple-antenna design combines dual-band Wireless AC with single-band Wireless N, resulting in a max throughput of 1.9Gbps. Furthermore, the antennas can be placed on a magnetic bracket so you can arrange them for maximum coverage better than ever before!



But if you want a good network card, then depending on whether you're looking for a Wireless N or Wireless AC example, you should budget anywhere from £15 to £40. The most expensive wireless AC network cards cost around £60 before you enter specialist territory, but most people won't need to spend that much to get a decent connection.

As with any hardware, at a certain point, you won't get a huge performance return on the money you spend, and we'd argue that network adaptors reach that point much earlier than most. If you're thinking of spending more than £40 on one, we'd strongly advise you to consider whether you'll actually make use of the speed and features it offers.

Keep these facts in mind, and hopefully the next time you buy a network card, you'll be able to make sure it's your best yet! **mm**

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# Embracing iSCSI

**Mark Pickavance explains why for those using a NAS box iSCSI might be a technology worth using**

**A** long, long time ago, just after the earth cooled but before dinosaurs ruled, I was an IT manager. And in that golden Hyborian Age, one technology offered much hope only to then dash those naïve enough to follow its teachings. Its name was SCSI.

Spoken in the ancient tongue as Small Computer System Interface, it was developed as a means to separate storage devices from the computers that used them. By doing this, the computer CPU could go about what it wanted to do, while the controller attached to the drives got on with its work, either retrieving or writing data.

It seemed like the perfect organisation, but to create a network of devices that could talk through a common data bus required a silly number of wires.

The first SCSI connectors were horrible parallel-edge 50-way connectors (SCSI Parallel Interface), which grew to dual 50-way

or single 68-way or worse. That meant the cables to connect drives were massively complicated and expensive, as well as extremely prone to connectivity failure.

If, as I did, you used multiple drives in a RAID array, the drives were chained, so a failure at any point could mess up the whole pack and not just one drive. Eventually, after many unmitigated disasters and data loss, those behind SCSI took the serial path, leaving many IT professionals suffering PSTS (post-SCSI traumatic stress) in its wake.

It was around this time that I vowed that no matter temptation was put in my path, I'd never use anything with the letters SCSI anywhere near it, because it was 'bad magic' and a significant contributor to the early onset of male pattern baldness.

But times change, and maybe, just maybe, even a repentant SCSI can tread the rocky road to interface redemption.



## Not SCSI, iSCSI

In the past five or so years, I've reviewed lots of network attached storage (NAS) units, and after some early stumbles, most of it available these days is remarkably good.

Initially devices were either designed for home or office use, with only a few finding themselves with a foot in both camps. These days, that's all changed, and most NAS products try to cover both requirements, and satisfy both the typical home user and the small business environment. In this transition, many of the products that were essentially built for home use started to take on features for business users. And one of the ones that many NAS box manufacturers now bundle is iSCSI (Internet Small Computer System Interface), a technology that Windows is also highly conversant in.

Where this diverges from its SCSI origins is that where the original technology required a local SCSI controller to interface the drive to the computer, iSCSI is designed to provide much the same functionality over a network.

What's really interesting from a technical perspective is that it achieves this using the same underlying command structure as SCSI; it just replaces horrendous parallel cables with Ethernet.

In doing that, iSCSI is a radically different approach to conventional network shares, because that technology provides the drive space more as a service. So when you connect to a network share on a NAS box, the file system at the other end is one that hardware understands, not the PC you're accessing it with.

Therefore, the function of the NAS box is to convert a file operation request on the PC into one that it can map to its local file system, because they don't generally format their drives with NTFS.

With iSCSI, the volume is accessible by the computer as if it was physically plumbed to the machine, so it can be formatted in whatever layout the PC likes and even encrypted.

A good analogy is a high-level versus a low-level language, where high-level code is easy to write and follow, but low-level machine code delivers the potential maximum performance for the effort of writing and debugging it.

With fewer layers of abstraction between the host and the client, iSCSI can deliver better performance while providing almost identical functionality at the client end.



▲ People who thought that cables like this were a good idea should be tormented forever more with the constant clicking sound that arrays make when they've been corrupted by bad SCSI writes.

Speed is one possible benefit, but the other advantage is that from an operating system perspective, the iSCSI connection is a local drive, and therefore any software that only works with local storage (like a live backup application) will work with the volume provided by iSCSI.

“ And in that golden Hyborian Age, one technology offered much hope only to then dash those naïve enough to follow its teachings ”

From an IT perspective, that's very useful, because applications that are normally required to be locally installed can be centralised, and they can also be upgraded much more easily.

There are some disadvantages, and I'll talk about them later, but in many respects the iSCSI path has a significant upside to the way that most people use NAS to share files.

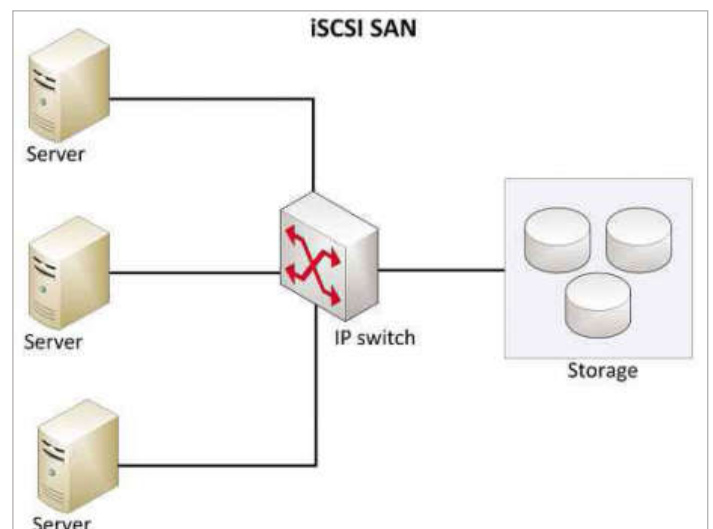
That's the theory. Now let's put that into practice, and see if there are any deal-breaking issues with getting more from your NAS box.

## iSCSI On NAS

Usually at this point in a Micro Mart feature, I'd be pointing you to numerous web locations to get a plethora of critical software utilities. In this instance, if you have a NAS box and a PC that's running Windows Vista or better, then you actually have everything you need to hand.

The software Microsoft has bundled since 2007 is called the iSCSI initiator, and you can even download it and install it on systems that run Windows 2000 and XP. That relegates this job to one purely of configuration, although exactly how you do that on the NAS end of the equation is vendor specific.

Assuming your NAS box has this functionality, and almost all do, there generally isn't any restrictions on requiring a specific



▲ the iSCSI SAN or iSNS is the ultimate destination for this technology.

RAID level or drive organisation. What you do need is some unused space, but then that's true of just about anything you'll want to do with the NAS.

If you have an old NAD box with a small drive in it, then that's an excellent place to experiment, though on most systems you can create an iSCSI host and subsequently remove it, without causing problems with anything else you have on there. As with any tinkering, though, if you have personal data on a NAS system, then I'd back it up before altering anything.

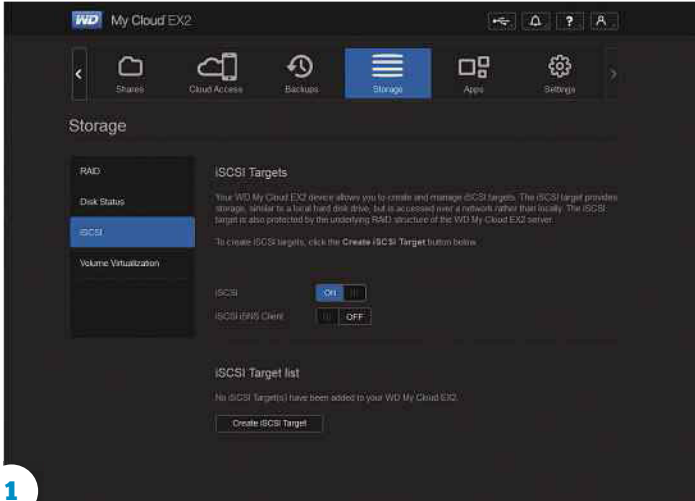
Right, let's unleash the hidden glory that is iSCSI!

### NAS Configuration

In my example here, I'll present how it's done on a Western Digital EX2 NAS box. The interface and options should be identical for any other Western Digital NAS equipment, and the process isn't radically different on other equipment.

**1** The controls for iSCSI are located under 'Storage' on WD's NAS operating system, and you can turn the service on and off from here.

The option you need to create an iSCSI volume is 'Create iSCSI Target', as the host part of this deal is referred to as the 'target' in this technology. What's interesting here is that this also allows you to operate as an iSCSI iSNS Client, a special functionality that I'll explain later.



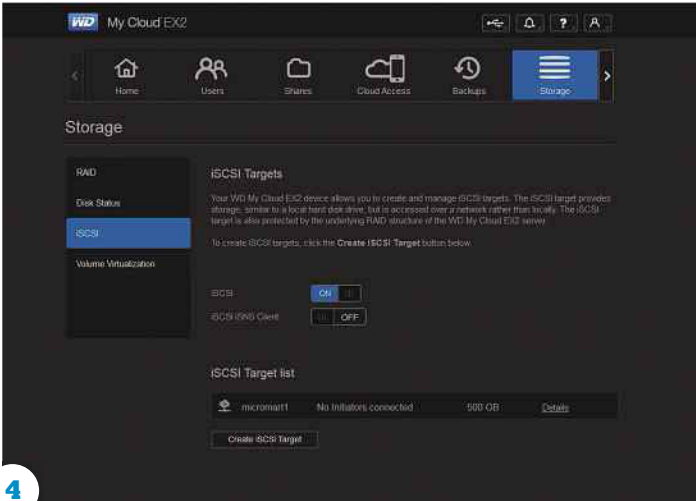
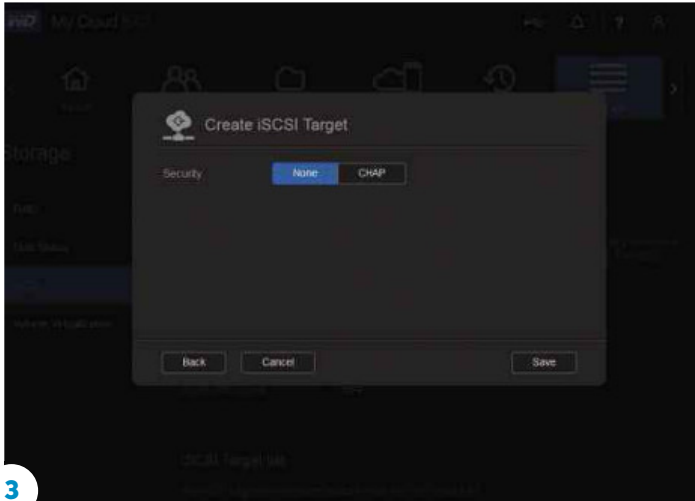
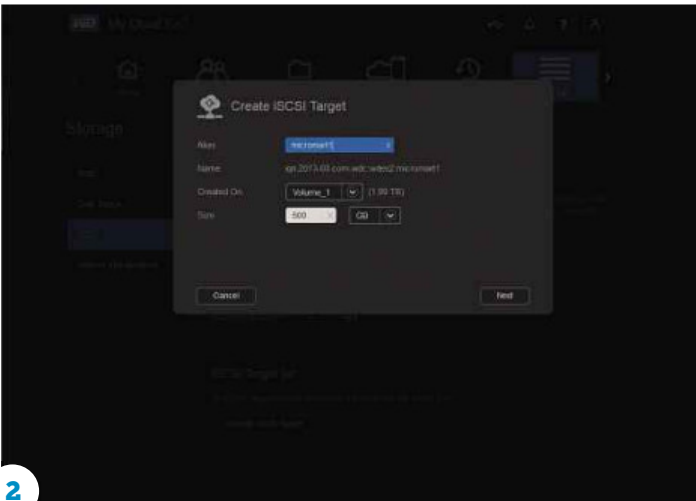
**2** Now you need to make two decisions; the name of the target and how much space you wish to allocate. I tried first to put 'MicroMart1' and it was rejected, because you're only allowed a lower case name. For this example, I set 500GB as the space, but you can allocate an entire volume if you wish. You can resize later, if you need more space.

**3** The final option is then presented, regarding what security you would like. As this was simply an exercise for me, I went with 'none', though you might want to consider CHAP (Challenge Handshake Authentication Protocol) authentication. For those interested, this is an authentication system where the Target can authorise the client, the other way around or both at the same time.

**4** That's all sorted at the NAS box end. The Target as defined is listed, plus 'initiators' (clients) connected. If you need to change it or delete it, you click on 'details'. It's possible to have multiple targets on the one NAS and to share them to entirely different computers. You can also do some clever things with iSNS that merge multiple sources.

### Initiators

Having created a Target on the WD NAS box, it's time to plug that into a PC using the built-in function of being an 'initiator'. I've used my work system that's running Windows 7 as an example, but the method is the same even on Vista and the latest Windows 10.







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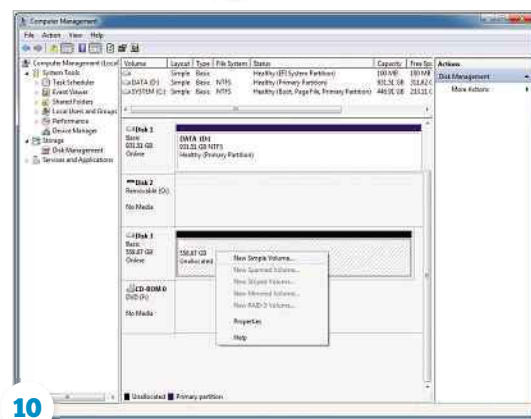
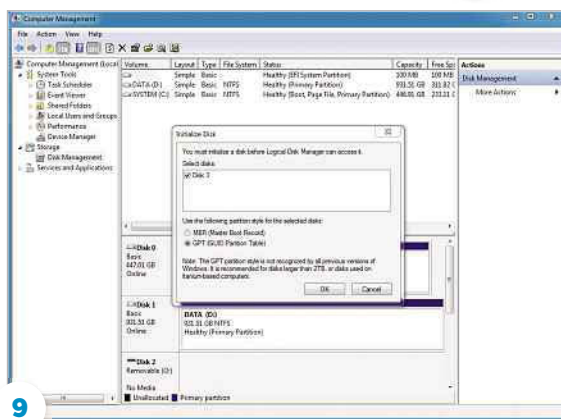
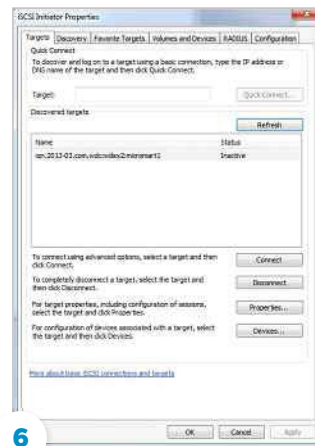
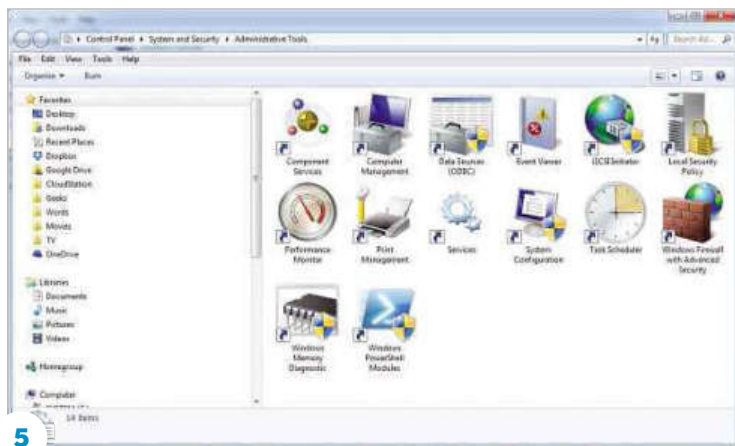
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“ Those who don’t have a gigabit LAN need not apply for this change, because the speed you’re getting is already severely capped ”

**5** The iSCSI initiator on Windows is located on the control panel under System and Security, and then Administrative Tools. If you take a closer look at the shortcut, you’ll find it points to %windir%\system32\iscsipl.exe.

On some systems, the iSCSI service isn’t run by default, and you’ll get a message asking if you want to start it. Obviously, you need to allow the service to start.

**6** My system immediately found the Target, but that’s probably because I’d been previously experimenting with this technology. Normally, you need to discover them, and that requires use of the ‘Discovery’ tab. Before you head in there, be sure to have established what the IP of the NAS box is, as you’ll need that info.

**7** To make the Targets visible on a NAS box, you need to put the IP number into the system under the button marked ‘Discover Portal...’. For those curious, it’s possible to change the default port that iSCSI works on via the NAS box, though that’s an extra complication that only the security obsessed might try.

**8** Once you’ve established the NAS box is a portal and the Target appears on the front panel, it’s time to ‘connect’ to the service. Highlight the target with the status ‘inactive’, and then click on the connect button. There are other options, like ‘Enable multi-path’, but other than the adding of this Target to the favourites, just clicking OK is enough for most users. All being well, the status should change to ‘Connected’.

**9** After closing the initiator, nothing seems to happen, but it is invisible in the background. To complete this exercise, we need to get to the management console and select ‘Disk Management’. The easiest way there is to right-click Computer and select ‘Management’. Immediately, you’ll be informed that there’s a new disk, and then you’re asked if you would like to initialise it.

**10** Things get a bit weird at this point, because the system reacts entirely like you’ve physically put a hard drive in it. You can partition it and format it in whatever ways you’d do for a real drive. For my testing, it I formatted it to NTFS and accepted the drive letter ‘E’, though this is easily changed if required. How this works hints at how the iSCSI sub-system connects to Windows at a relatively low level.

## What Does This Achieve?

For some people, this might seem like a very convoluted way to achieve exactly the same result as just creating a share and then connecting to it. To a degree that’s true. At least it would be if a drive connected via iSCSI and one using a CIF share performed identically. But thankfully, they don’t.

Due to the way that iSCSI works, it is theoretically a superior way to connect to remote storage. That was the generalisation that I approached this subject with. It turns out that it isn’t that





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BASE UNIT:	FULL SYSTEM:
<b>£479</b>	<b>£629</b>

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#### Main Features:

- ★ AMD FX8-Core FX8320 3.5GHz CPU
- ★ 8GB DDR3 1600MHz Corsair Vengeance
- ★ 1TB SATA3 Hard Drive
- ★ 2GB AMD R7 370 OC Graphics Card
- ★ 600 Watt Cooler Master / EVGA PSU

#### Additional Features:

- Cooler Master K350 Gaming Case
- Gigabyte / MSI 970A Motherboard
- 24x DVD±RW Dual Layer Drive
- Choose Windows 7 / Windows 8.1 / Windows 10

#### Included with Full System:

- 24" AOC Monitor
- Cooler Master Gaming Keyboard & Mouse
- 2.1 Sub Woofer & Speakers Set

BASE UNIT:	FULL SYSTEM:
<b>£599</b>	<b>£749</b>

### DEATHADDER



#### Main Features:

- ★ Intel i5-4690K Quad Core 3.5GHz CPU
- ★ 8GB DDR3 1600MHz Corsair Vengeance
- ★ 2TB SATA3 Hard Drive
- ★ 4GB Nvidia GTX 970 Graphics Card
- ★ 600 Watt Cooler Master / EVGA Bronze PSU

#### Additional Features:

- Zalman Z11 Neo Gaming Case
- Gigabyte / MSI Z97 Motherboard
- 24x DVD±RW Dual Layer Drive
- Choose Windows 7 / Windows 8.1 / Windows 10

#### Included with Full System:

- 24" AOC Gaming 1ms Monitor
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- ★ 1TB SATA3 Hard Drive
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- ★ 750 Watt Cooler Master / EVGA Bronze PSU

#### Additional Features:

- NZXT Phantom 410 Midi Case
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- 24x DVD±RW Dual Layer Drive
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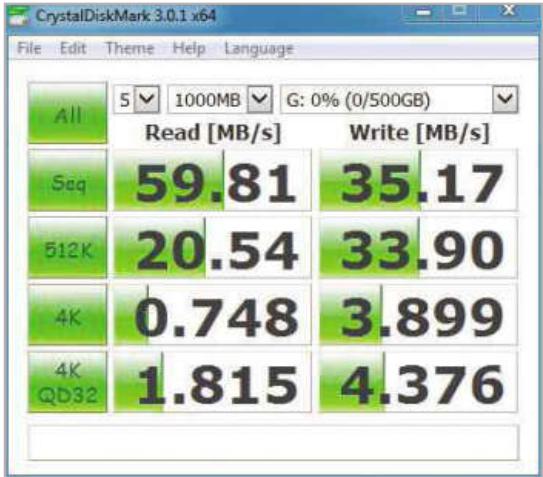
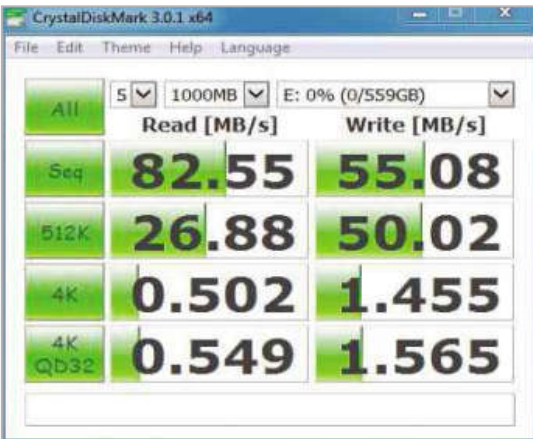
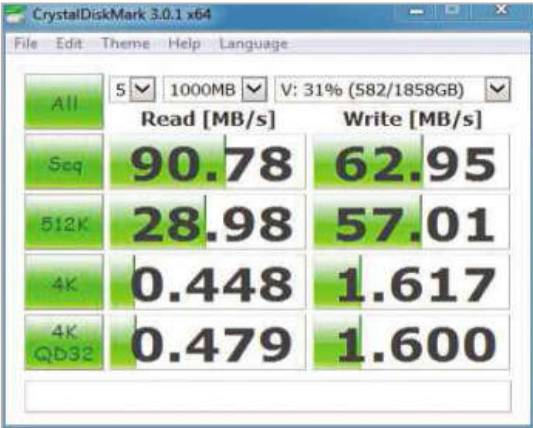
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straightforward, being dependent on what hardware you have and who implemented iSCSI on it.

The first NAS box I tried this out on was the Western Digital EX2, a dual-drive NAS box with two WD RED 2TB drives in a RAID 1 (redundant) configuration.

Here are the results with a CIF share first and a iSCSI target second.

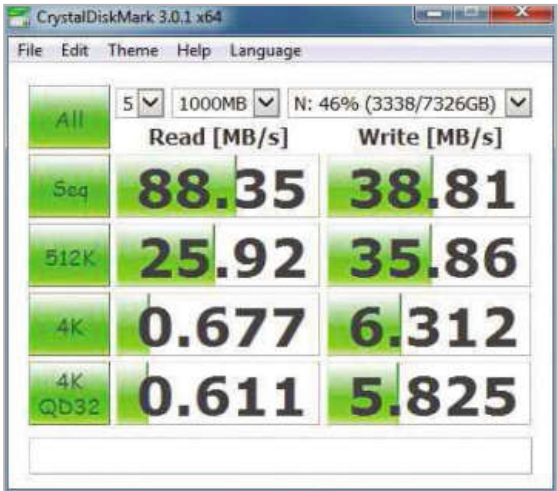


Mmm....not exactly what I was expecting. For whatever reason, this NAS box with this configuration iSCSI is slower at both reading and writing.

Logically, I decided to try some different hardware and also a different drive layout. The test subject here was a Synology DS411 with four 4TB drives in a hybrid RAID layout that is similar to RAID 5.

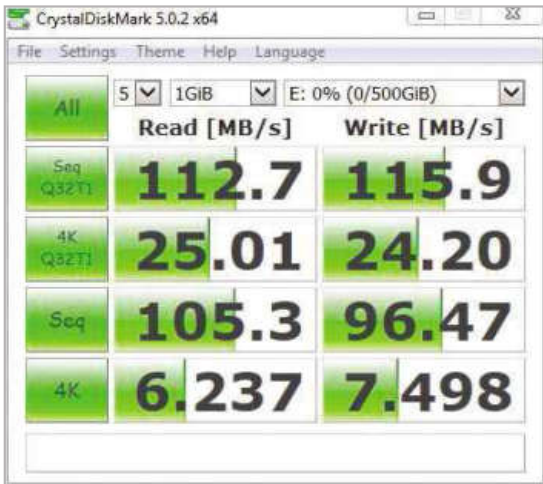
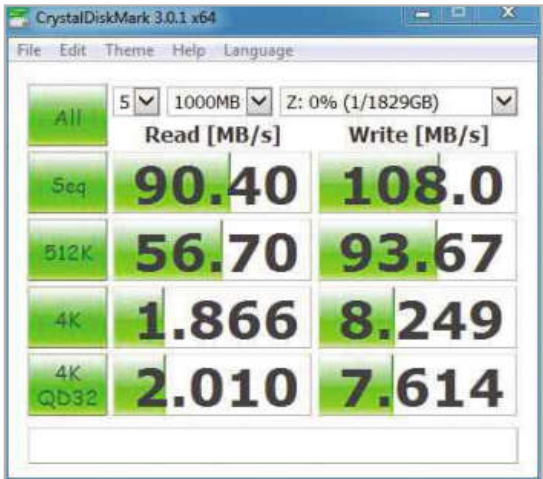
Results, again with CIF first, followed by iSCSI:

Again, iSCSI was slower, though the write speed was much closer. My conclusion here was that a major factor in this and the previous results was probably the CPU performance in both NAS boxes. The DS411 is getting rather elderly, being four years old, and the EX2 hasn't a massive amount of processing power.



This guesswork on my part needed some corroborative evidence, which thankfully came when I was sent a Synology DS215+. This is a much more powerful NAS box than either of the other devices, though it shares the dual-drive layout of the EX2 and the operating system of the DS411.

Results:





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There is a reversal of fortunes for iSCSI here that can't be ignored, because with sufficient processing power pushing it, the results are self-evident.

These tests were performed with the drives in RAID 1 mirror mode, though it might be possible to get even better ones using a RAID 0 layout if you prepared to double your chance of catastrophic data loss. However, these numbers are at the very top end of what a single gigabit Ethernet link can deliver, so striving for more might be fruitless without using both LAN ports and an aggregating network switch. Those who don't have gigabit LAN need not apply for this change, because the speed you're getting is already severely capped.

If you have a NAS box and you have no idea how it would work with iSCSI, then it's probably worth an hour of your time to experiment. Setting up a simple 500GB target and connecting to it through the SCSI initiator is relatively painless. And if your NAS box performance isn't up to the job, you can always delete the settings and go back to using it through conventional network shares with no harm done. In this respect, you don't need to fully commit to iSCSI to experiment, which is another excellent feature of the technology.

Since I did these experiments I've realised that Synology NAS boxes offer both an iSCSI LUN using regular files and an alternative block-level option. That second option allocates an entire volume to iSCSI and therefore isn't as easily reversible. However, it does allow even greater performance, if you're prepared to put your entire NAS box over to using it.

I suspect block-level iSCSI will also allow for better than CIF speeds on lesser hardware.

## Hang On!

Having made a solid case for using this technology, I now need to counter that suggestion by explaining how doing so isn't always the best course of action, because along with many virtues, it also harbours a few critical drawbacks.

One caveat to using iSCSI is that when you connect it to more than one system, you need to be mindful of any potential conflicts that might arise, as two or more computers try to access the same drive.

That could lead to security problems, along with file locking scenarios, though these can be relatively easily overcome. Oddly, it's also possible for one PC to get into conflicts with itself on iSCSI, with multiple applications stepping on each other. Most of the iSCSI implementations have a mode that allows multiple sessions from one of more iSCSI initiators, but it assumes you're operating in a cluster-aware file system.

Another snag is that while PC operating systems have iSCSI initiators, appliances generally don't. So a smart TV or the box you use to play video files on your TV won't be able to link into these targets like they can into CIF shares. That's probably the single biggest reason not to use iSCSI, because what you've done is traded performance for flexibility.

## More Things You Need To Know

While I was doing this, all manner of minor details kept coming into my head that I need to pass on, because there are many sides to the iSCSI polygon and lots of things that you can and can't do with it.

Firstly, let's explain target sizing. Let's imagine that you create a Target that is 1TB, and then you suddenly need another 500GB. That isn't a problem, because you can simply allocate more space (if you have it available on the NAS) to the target. Then you go to the disk management console and expand the volume to accommodate the change at the PC end.

The snag comes if you want it smaller, because that isn't an option. What you need to do then is copy all the files off the Target, delete it, create a new smaller one with the same credentials and copy it all back. That might seem like a kerfuffle, but it gets around the problem of what to do if the content takes more room than the space you've allocated.

Those behind iSCSI thought about things generally getting bigger and not smaller, which, given the last 30-odd years of computing, seems a reasonable assumption.

That thinking went even further, however, in that they created technology in iSCSI that allows multiple targets to be presented as a single connection. The beauty of doing this is that you can have a single drive letter, and in that multiple folders, each of which is actually located on a different NAS box or server. Each can be expanded as needed, and entirely new machines can be bolted in as folders or sub folders as required, without anything special being done at the PC end.

The technology is called iSNS (Internet Storage Name Service), and to manage the solution you need to configure a machine as the iSNS Server. Unfortunately, most NAS boxes don't have the capability to become an iSNS server, though they generally do have to register their iSCSI targets with one and therefore become part of an iSNS setup.

Maybe I'll cover creating an iSNS server in another article, though the number of readers it might interest could be limited. The advantage of this over a conventional fibre channel SAN is that it's software, and therefore cheap. Some fibre channel switches are more than £500 per port, and the storage arrays that they connect can easily run into tens of thousands.

Also, configuring and managing a SAN isn't knowledge that all IT people possess or have the aptitude for, whereas most can handle the relatively straightforward networking on which iSCSI is built.

One last aspect to iSCSI is subtly hidden in the acronym, because it's entirely possible to connect to a target across the internet if you have a fast enough connection to make it work.

I suspect in the future when broadband speed reaches a high enough level, we'll all start connecting using similar technology, so our home servers are all easily accessible from a laptop while we're at work.

## Final Thoughts

Have I forgiven SCSI for what it put me through in the 90s? Never. But I've come to realise that its intentions were pure, even if its implementation ultimately lured it away from the righteousness of complete system integrity. Those without a history of unintentional data-loss, cast the first stone, I say.

What's fascinating about its offspring, iSCSI, is that something designed for big business to use is now filtering back into the mainstream and could be very valuable for home users, if they understand it exists and how to use it.

That's why I wrote this article, because somewhere out there is a problem that iSCSI solves and does so rather elegantly.

It isn't for everyone, and how it can be rationalised with conventional file sharing methodologies isn't entirely obvious, but it's an interesting direction that NAS boxes are now going in – even if the majority of owners are unaware of this iSCSI capability and how it might make more of the hardware they have.

Actually, looking at the functionality that many NAS box makers are now filling their NAS boxes with, it might be worth you getting more familiar with what yours can do, because like iSCSI, there might be some technological hidden gems in there for you to mine. [mm](#)





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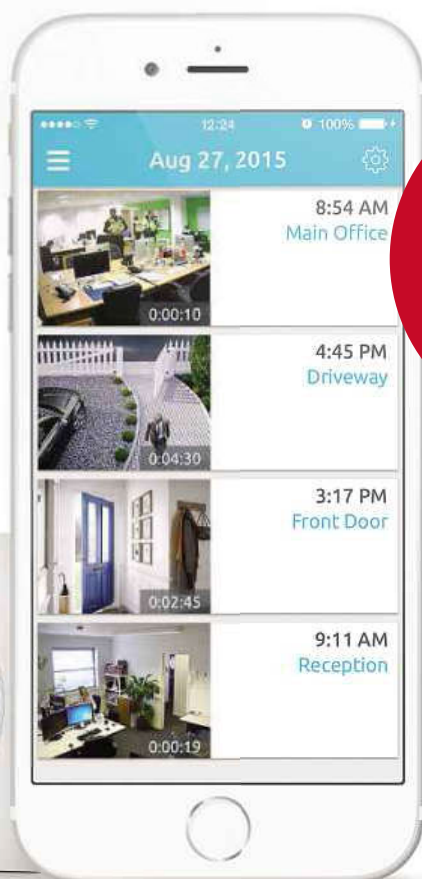
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# AMD: Losses Mount

**Mark Pickavance looks at the sorry financial state of AMD and wonders how much longer this can go on**

**L**osses for AMD are something of a regular occurrence, but even its most ardent supporters drew breath when AMD recently announced its straight fourth quarterly loss.

The third quarter for 2015 saw the plucky chip maker blow another \$197 million (£127m), bringing the total for this year to \$557 million (£360m). Revenue was \$1.06bn, so for every pound AMD spent, it only made about 80 pence back. If there is an upside to any of this, it's that revenue was only expected to be \$995m, so that was marginally better than expected.

What's colouring lots of views on AMD, though, is its track record over the last 17 years, but balancing those good times against the less wonderful still leaves it an eye-watering \$8bn in the hole.

Even ignoring the lengthy history of losing money, what concerns many analysts is that year on year, things aren't improving; they're actually getting worse. Year on year, revenue for AMD has declined by a whopping 26%, and should that continue, the next two quarters could be catastrophic.

Included in the figures are a \$65m write-down of unsold APU stock that AMD clearly over produced, a tendency that seems endemic in the tech sector.

In an attempt to placate angry investors looking for the nearest fire exit, AMD announced that it would be spinning off its assembly and test facilities in a joint venture with Nantong Fujitsu Microelectronics. The Chinese business bought 85% of those assets, and that put \$371m back in the kitty.

Dr Lisa Su, AMD president and chief executive, also continues to talk confidently: 'We continue to take targeted actions to improve long-term financial performance, build great products and simplify our business model. The formation of a joint venture of our back-end manufacturing assets is a significant step towards achieving these goals and strengthening our balance sheet.'

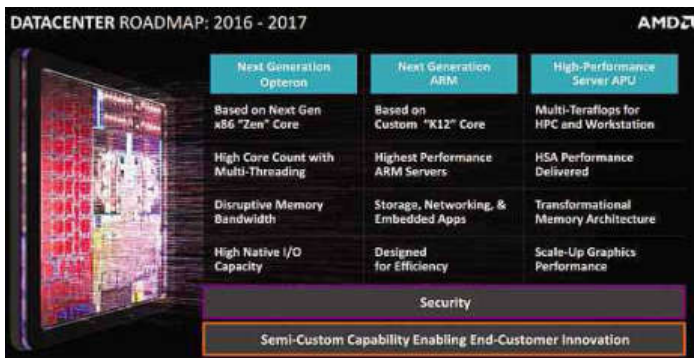
But the reality is that the stock market has heard it all before, and shares declined roughly 3% on the day of the announcement.

## Where From Here?

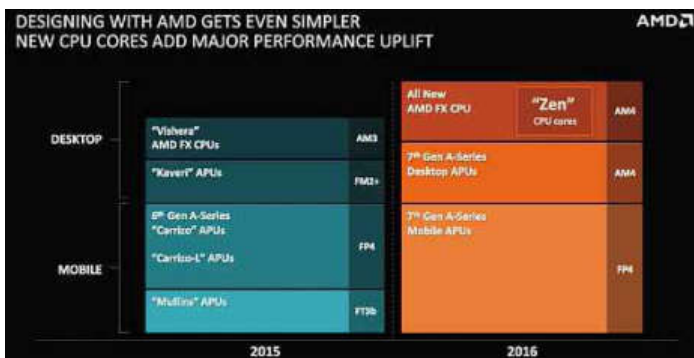
The fourth quarter of 2015 might be even worse, depending on whom on Wall Street you listen to. Most analysts are pitching just







▲ **AMD wants to rule the datacentre with new x86 and ARM processors, but is this to the detriment to its desktop ambitions?**



▲ **14nm Zen is coming to the AM4 socket, but will it come quickly enough to save AMD?**

a \$950m turnover, a full 10% down on Q4 2014, mostly down to seasonal declines in its semi-custom product lines.

Ironically, it's these and non-PC product lines that AMD is pinning its hopes on in 2016, because PC sales are likely to decline further as people realise that they can actually do lots of typical PC jobs with just a tablet or their phone.

According to AMD's latest roadmaps, the second half of 2016 will see its first FinFET node chips, a technology that could ultimately lead down to 7nm and even 5nm fabricated chip parts.

The actual chip maker, Global Foundries, was once part of AMD that spun off in 2009 and is now owned by IBM. It has declared its first FinFET technology is ready for production, starting with the more modest 14nm scale. That's still a vast improvement over the 32nm or 28nm, on which the majority of AMD's processors are currently built.

That puts it on par with Intel's Skylake fabrication, and it has the possibility to take AMD even smaller down the road.

Despite promising AM3 'Vishera' FX processors in 2015, there haven't been any, and next year AM4 will arrive with the new Zen-class processors and the end of AM3+. Since 2013, the desktop side of the AMD equation has effectively languished, and socket AM4 will not only revitalise that line but also provide a single socket for both FX and APU product lines on the desktop.

From what information has been made available, it looks like Zen will switch AMD from modular CMT (Clustered Multithread) to SMT (Simultaneous Multithreading) micro-architecture, as used by Intel. This allows for more per-core performance rather than hoping that multi-core operations deliver a better overall experience, and it allows for larger dies with more computing power on them.

As with the Fury GPU, AMD badly needs some headlines that place its CPU and APU product lines at least on a par with what Intel is doing, rather than lagging behind.

AMD needs to ditch the association it has with the discount end of the computing spectrum and deliver products that people are

happy to pay a profitable amount to own. Otherwise, the future isn't going to be bright.

## Final Thoughts

As more time passes, it seems like the heady days of the Opteron launch are long behind AMD, possibly never to return. Seen with the benefit of hindsight, those ground-breaking chip launches that shook Intel to its very processor intensive core look increasingly like AMD merely woke the sleeping giant, rather than delivered any lasting redress to the computing status quo.

The lack of any meaningful development on the FX line until recently, where the last new processor turned up more than a year ago, strongly indicates it no longer want to compete in the desktop CPU market with Intel. However, its roadmaps say otherwise, confusingly.

It's entrenched in the desktop PC, budget laptop and micro PC markets with its APU products, a series that has never really delivered the combination of CPU and GPU power that AMD once promised. Will 14nm actually make the APU shine at last?

It's also bought into the ARM revolution, although with Qualcomm and others banging away in that sector, it could be hard for AMD to be heard above that cacophony. Should it just focus on x86, even if that is a shrinking market?

The sad reality is that had it not bought ATI, there really wouldn't be much of an AMD story to tell these days, and even that came with a sting in the tale. After years of chasing Nvidia somewhat fruitlessly, it's now delivered the Fury, only for the steam to go out of the discrete video market. That's not helping the bottom line, though there always appears to be some good reason why it's never as healthy as it might have hoped.

Market fluctuations aside, the problem AMD has is balancing its ambitions with the scale of its business in what is currently a shrinking market for its products. These are largely the same problems that Intel must contend with, but it has a much larger pile of cash and significantly more patient investors than AMD. Even Intel is catching a cold with the slowdown in PC sales, but the weaker AMD might be getting pneumonia if it doesn't pick up soon.

Along with cash, AMD also seems to be bleeding talented people, as its resident chip guru Phil Rogers left to become Compute Server Architect at Nvidia only a few weeks ago, probably taking with him some of its better product ideas. Rogers had been at AMD for 21 years, so this exit can't be brushed off as youthful ambition.

If AMD is to survive, there needs to be a root-and-branch exercise in reducing its costs, or 2016 will probably be the last spin of the dice for this unique company. **mm**



▲ **The Kaveri replacement, 'Carrizo', will have 29% more transistors. But will it address the shortfalls of previous APU designs?**



# Top 10 Gadgets For Lazy People



**Sarah Dobbs finds ways to make less effort in life. Much less effort...**

**L**aziness gets a bad rap. After all, what's wrong with wanting to get more things done with less effort? Making work easier has been the inspiration behind many, many brilliant inventions – okay, yes, you could argue that it's about efficiency and not laziness, but what's the difference? If you can make boring everyday tasks quicker and easier, then you're just freeing yourself up to do other, more important things.

With that in mind, we've rounded up ten of the best gadgets for lazy people currently on the market. These things claim to be able to take the effort out of those things none of us really want to do. How much of your life can you outsource to robots? Let's see...

## 1. A Robot Vacuum Cleaner

**Price:** From about £100

I'll start with an obvious one. No mid-century vision of the future would be complete without a robot maid, and while we've lost the bizarre (and sexist) robotic woman styling in favour of something that looks more like a tiny UFO, robot vacuum cleaners are very much a real thing now we're in the 21st century.

The most well-known brand is the iRobot Roomba. The first Roomba came out in 2002, but there have been several upgrades since then. The newest generation, the 800 series, is brushless (it

uses rubber extractors to clean floors instead) and has numerous sensors built in to stop it crashing into walls or down stairs. The more expensive models (around £600) also have bigger bins, so they can pick up more dust and dirt before they need to be emptied.

Other brands have also got in on the robotic vacuum action, though, so if you don't fancy a Roomba, you could invest in a Samsung NaviBot or an LG Hom-Bot. You could also think about sticking your name on the waiting list for a Dyson Eye 360. Dyson spent years and millions of pounds on developing what it reckons will be the most powerful robot vacuum cleaner on the market.

**How much time and/or effort will it save you?** How much time a robot vacuum cleaner will save you depends on how much time and effort you spend vacuuming in the first place. If you've got a lot of floor space and/or pets, it could make a real difference. If you don't tend to vacuum very often, well, it might not save you time, but investing in one might give you markedly cleaner floors.

## 2. A Mopping Robot

**Price:** From about £20

Some floors in your home probably need more than just vacuuming, but it's okay: there are floor mopping robots to save you that job too.





iRobot is again one of the front runners here, with two different floor-cleaning robots. The Braava range consists of floor polishing robots; fitted with soft cloths or cleaning pads, they can be used wet or dry and will give hard floors a good wipe clean. The Scooba range is a bit more hardcore, and has two tanks, one for clean water, which it pushes over the floor, and one for dirty water, which it sucks up as it goes. The more expensive version also vacuums the floor first, spitting out cleaning fluid onto stains, which it then goes back and scrubs away. Impressive stuff, but you're looking at around £200 to £600 for either of the iRobot moppers.

There aren't as many mopping robots as vacuuming robots available, but there are a couple, and they're a lot cheaper than the iRobot ones. Vileda makes a polishing robot, the ViRobi Cleaning Robot, which is similar in concept to the Braava and goes for around £40, or there's the RC Sugoi remote controlled mop, which will set you back about £20. You need to actually direct this one yourself, which means you don't really save any time because you can't just set it going and leave it. But it is definitely lazier than actually pushing the mop yourself.

**How much time and/or effort will it save you?** That depends which model you go for, but the Scooba can pretty much handle all the mopping and floor scrubbing you could ever need doing. Whether it's worth the money is another question – and that depends on how clean you like your bathroom.

### 3. A Motorised Duster

**Price:** About £10

Sadly, no one has yet created a robot that will do the dusting for you. The closest you're going to get is the Go Duster, which is a battery powered duster that you hold on or near the things you want to dust. The fibres spin around and remove dust, saving you from, erm, moving your arms very much. That's basically it. You can take the duster head off and wash it, which extends the life of the Go Duster, but there really isn't much more to say about it.

**How much time and/or effort will it save you?** Hmm. Honestly, not very much. For most people, this would probably just be a novelty, since it doesn't really save much more energy than your average feather duster. Perhaps if you have a lot of intricate ornaments that need thorough dusting, this might save you some effort.

### 4. A Robotic Lawn Mower

**Price:** From around £1000

Mowing the lawn is more of a seasonal task than vacuuming, but that doesn't mean it's not one we shouldn't hand over to robots. Hayfever sufferers might be particularly interested in automating this task – yeah, freshly cut grass smells lovely, unless it triggers a sneezing fit.

Robotic lawn mowers tend to be pretty expensive, though. The cheapest models come in at around a grand, and those tend to be for smaller lawns. The Flymo 1200R, for example, can mow lawns of up to 400 square meters. It's pretty smart: you can set boundaries so that it won't wander off and mow the neighbours' flower beds down, and it can be set to a range of different grass lengths, plus it has lift and tilt sensors that mean it'll stop if it encounters obstacles. It doesn't collect grass cuttings, so you don't need to empty it out, and it'll even work in the rain.

If you have a bigger garden or need something that can cope with non-flat surfaces, you might want to look into the Husqvarna Automower range. They claim to be able to handle variable terrain, and the bigger models can cover surfaces of up to 6,000 square meters. (The price is similarly increased, though; you're looking at around £2,500 for one of these.)

**How much time and/or effort will it save you?** Loads. The more advanced ones can be set to run on schedules too, so you hardly have to think about it at all.

### 5. A Smartphone-Controlled Thermostat

**Price:** £249

Moving away from house and/or garden work now, the Hive smart thermostat system lets you control the temperature of your home from your smartphone. As the laziest among us can tell you, anything that means you don't have to get up is a plus, so this is ideal if you fancy turning up the central heating without getting off the sofa.

The idea is that you can turn the heating on when you're on your way home so you get home to a cosy house or that you can make sure you've turned it off when you're at work or going on holiday so you save money on your energy bills. That's all great, but the real benefit is that you can just turn the heating up a couple of degrees from wherever you are – like from the comfort of your bed.

**How much time and/or effort will it save you?** Okay, there's no real time saving here, but can you imagine how decadent it would feel not to have to actually move towards the thermostat or boiler when you want to change it? Bonus for people with kids: no one can mess with the temperature except you, because it's all done from your phone.

### 6. An On/Off Switch On Your Phone

**Price:** From £39.99

It's not just your heating you can control from your phone. Nope. You can now buy switches that allow you to switch on and off pretty much anything in your home, from an app installed on your phone.

Belkin's WeMo switch is the obvious starting point. For £39.99 you get a switch that you plug in between your appliance and the



wall. Then you can switch that thing on and off from an app, which is available for iOS and Android. If you want to add more than one appliance, that's no problem; you can buy more switches and add more stuff to your network.

Basically, you could set up your home so you never again have to wonder whether you left the iron on this morning; you could just make sure it's switched off via your phone.

There are other systems for switching lights on and off, the most elaborate being the Philips Hue bulbs. Hue bulbs are wireless colour-changing bulbs that can be controlled from your phone, and they cost £149.99 for a set of three. With those, you can adjust your mood lighting without getting up, which is pretty exciting.

**How much time and/or effort will it save you?** The effort it takes to walk to a light switch and flip it on or off, basically. But there's an energy saving side to some of this stuff, and if you're prone to worrying about leaving appliances on, it might save you a lot of mental energy.

## 7. A Wi-Fi Baby Monitor

**Price:** Around £200

Wait – don't skip this just because you haven't got kids! But if you have, a wireless baby monitor like D-Link's EyeOn could be really useful. Basically, it's a camera designed to be set up in a baby's room, so parents can check in via smartphone and make sure they're okay.

The EyeOn's smartphone controls are pretty advanced. You can pan and tilt the camera, and even zoom in to really see what's happening. You can also take photos and videos and save them to your phone, and even play lullabies out of it.

If you don't have kids, though, these things can be used as security cameras. You just set them up in your home, and then check in via your phone while you're out and about. The EyeOn works with both iOS and Android, but there are loads of other alternatives too. If you already have an old Android tablet or phone, you could use the Dormi app to turn it into a monitor.

**How much time and/or effort will it save you?** Again, this might be more about peace of mind than laziness. However, if you're a new parent and prone to checking on your kid multiple times a night, it will save you actually going to their room to check they're still there and still breathing.

## 8. A Smoothie Maker

**Price:** From about £50

Want to feel healthier but don't feel like making much effort? The laziest way to nudge yourself towards better health is to invest in a smoothie maker. Not a blender, not a juicer, but a smoothie maker. While juicers and blenders of the past were time-consuming to clean, the new breed of smoothie makers are designed to be as easy as possible to use and maintain.

The Nutribullet is the biggest brand name here, and they start from about £50. That sounds like a lot, but enthusiasts insist they're better at blending, chopping and grinding, making for smoother smoothies – which means you're more likely to want to drink them, and also you can make sure you're getting plenty of fibre, not just juice.

If you really have cash to splash, Vitamix makes smoothie makers that go for £450 or more, but at that price you might as well just sign up for a posh gym membership.







**How much time and/or effort will it save you?** Well, it saves on washing up, and it encourages you to get all the fruit and vegetables you're meant to eat, so potentially quite a bit. And you get to feel virtuous into the bargain.

## 9. An Automated Tea Or Coffee Maker

**Price:** From about £50

The lazy person's best friend is caffeine, but though there are plenty of coffee-making gadgets around, they still require you to get up and start them running, which can seem like a lot of effort, especially first thing in the morning. Enter the automated tea and coffee makers. With built-in timers, you can set them to make you a brew just as your alarm clock's going off, making waking up considerably more pleasant.

Russell Hobbs makes a timed coffee maker, the Buckingham Stainless Steel Coffee Maker, which can be set to make your coffee in advance and has a heated platform to keep your cuppa warm while you get ready. It can make up to ten cups at a time, though it can be set to just brew two, which might be more sensible if you don't have a huge number of coffee drinkers in the house.

For tea drinkers, the classic Teasmade might be the answer; you can pick up a vintage styled one for £65.

**How much time and/or effort will it save you?** Minutes, probably. But who doesn't like the idea of having a robot make their coffee, just the way they like it, while they're still fast asleep?

## 10. A Beer Pouring Robot

**Price:** Around £500, if you can find one

We're back into sci-fi territory here, except these things do exist; they're just almost impossible to get hold of. The Asahi Robocco BeerBot is a robot that serves you beer: it has a refrigerated compartment that can hold up to six cans of beer, and at the press of a button, it pulls a can upwards, opens it and pours it out.

Designed and built for the Japanese market, it's designed for smaller beer cans than we're used to, but it seems to be able to cope with bigger ones. The robots did briefly go on sale for \$800 a pop, but there were only a limited number available, and they seem to be impossible to buy at the moment. Shame.

**How much time and/or effort will it save you?** Hardly any at all, which makes the Robocco beer pouring robot the ultimate lazy gadget. Shame it would take so much effort to actually find one!

## Be Lazy, Be Happy

There you go. Ten robotic or automated gadgets designed to make your life run more smoothly, if only for the five minutes it would normally take you to get up and do something for yourself. You might scoff now, but when you consider how many labour-saving devices we all use already (dishwashers, washing machines, even cars), it feels a lot more plausible that in the future we're going to let robots do even more of the work. Then all we'll have to worry about is maintaining and fixing our robots. Easy! [mm](#)





Campus 2 illustration 1

# Spaceship Apple

## David Briddock investigates Apple's huge circular Campus 2 project

Apple is building a new campus to complement its existing HQ at One Infinite Loop. The official name is Apple Campus 2, but many are calling it the 'Spaceship Campus'.

As you'd probably expect from Apple, there's very little official information on what's actually happening, but with a site this big, in reality it's impossible to keep the whole thing under wraps. Nevertheless, tight security means it's difficult to drive or walk close by to glimpse what's going on.

However, the aerial route is still wide-open. In addition to the obvious aircraft fly-bys, some enterprising individuals have employed

drones to rise above and around the site, taking revealing images and video footage of the construction site.

By piecing together official statements and news items, plus web-posted pictorial and video information, the big picture is revealed. And it's an intriguing and impressive picture.

### Bold Statement

As you'd expect from Apple, the construction plans make a huge statement about its presence in the technology world – one that accentuates the company's image through bold design and attention to detail.

We've seen similar bold design Apple statements before, albeit on a much smaller scale, such as its patented glass-cube-topped 5th Avenue New York Apple Experience store. Campus 2 is the sort of grandiose vision that can only be realised by one of the richest companies on the planet.

Steve Jobs himself was involved early on. In particular, the overall design had to be self-sufficient and use earth-friendly materials. Despite his untimely death, his influence remains strong. Jobs wanted no seam, gap or paintbrush stroke showing. Walls, floors and even ceilings need to be polished to a supernatural smoothness. And not only was





Campus 2 illustration 2

## At A Glance

- 176-acre site.
- 2km long circular building.
- 12,000 employee capacity.
- 14,000 underground car spaces.
- 1,000-seat auditorium .
- \$70 million wellness centre.
- 4km of water recycling pipes.
- 7,000 trees including an orchard.
- \$5 billion total cost.

inspired by the idea of a London square. Here, high density buildings form the perimeter of a site, creating what is essentially a mini-park in the centre.

This initial concept eventually evolved into the present design, a circular structure enclosing a large parkland area. Norman Foster revealed the original plans had no mention of a circular 'spaceship' structure. As he said, "It didn't start as a circular building; it really grew into that. The idea of one building with a great park was really born out of a very intensive process."

It's a complete contrast to the typical office buildings surrounded by concrete parking lots. And by taking full advantage of the huge plot and Foster & Partners design, Apple believes

does look like an alien spaceship has settled on the Californian landscape.

Of course, there has to be a car park (in this case, one large enough for around 14,000 vehicles), but here it will be buried underground, which means when employees and visitors look through the glass walls, they won't be confronted with a sea of parked vehicles.

Foster & Partners has already done work for Apple, notably the recently opened Caffè Macs employee cafeteria at Apple's Cupertino campus. Intended solely for Apple employee use, the design brief was for a place where employees could discuss work in a secure and private area. Built over a two-year period the 21,468 square foot space includes a kitchen, server area and espresso bar, along with high ceilings, stonewalls, glass facades and terrazzo floors.

We can expect the new restaurant and collection of drop-in cafe facilities at Campus 2 to be influenced by the Caffè Macs design. However, the overall scale is very different, with the main Campus 2 restaurant expected to be around eight times larger and spanning two floors.

## Size Matters

The Apple Campus 2 sprawls over 176 acres, which equates to 2.8 million square feet. To put this immense size into some sort of context, it's large enough to build a typical university campus, say with around 16 or 17 separate buildings.

The four storey tall circular building itself is also enormous, with a circumference of two kilometres, so it could take a while to walk from an underground car park to your office or visit a colleague in another part of the building. There'll also be a network of subterranean elements – possibly an ideal location for secret research labs.

The structure will be faced with huge walls of glass, allowing employees to look out from all sides of the ring. Peter Arbour, an architect for Seele, which makes the glass staircases in Apple stores around the world, said, "It is something like six kilometres of glass."

Currently, Apple is leasing 290,000 square feet of new office space in nearby Sunnyvale

all the interior wood to be harvested from a specific maple species, but the brief insisted that only the finest quality centre-located heartwood should be used.

## “ Apple is dipping into its vast cash reserves to construct a truly iconic building ”

And now Jony Ive has been promoted to chief design officer, he'll no doubt maintain this quality focus, while taking an overall design perspective, right down to the selection of employee desks and chairs.

## Architectural Vision

The British firm Foster & Partners was appointed as the architects (see boxout). In an interview with Architectural Record, founder and chairman Norman Foster said he was

it can recreate a little piece of the original Californian landscape right in the centre of Cupertino.

## Human-Centric Design

A circular design also brings a sense of human scale to the whole project. For example, you could walk (or cycle) across the central area to visit another part of the building, rather than walking along long corridors. And viewed from above, it really

Crossing. Occupying seven buildings and with room for around 1,450 workers, it's close to both the new Campus 2 site as well as the existing current Infinite Loop campus.

Campus 2 is designed to accommodate more than 12,000 employees. Employees with a diverse range of skills and environmental needs, such as researchers, product designers, software programmers, marketing teams, retail specialists and management.

All these statistics are undoubtedly impressive, but the bare figures don't really tell the bigger picture of what Campus 2 is all about. Let's dig a little deeper into the people-centric aspects, environmental initiatives and ongoing site construction

## Employee Facilities

The 12,000 employees will share some remarkable facilities. The main office structure itself is broken down into lobby areas and entrances, cafes and meeting places, while the huge restaurant offers vistas across the central park.

A 1,000-seat auditorium and presentation element allows Apple to host large on-site product launch events for the first time. Currently, Apple has booked similar sized auditoriums in and around the San Francisco area.

And there's a wellness centre, with high-tech fitness equipment, plus mind and body health services, to ensure everyone is healthy and happy. This centre alone is said to cost \$70 million and be large enough to cater for Apple's entire Silicon Valley community, which numbers around 20,000 people.

The parkland central area was a key Steve Jobs requirement. Jobs loved the Main Quad space at the Stanford University campus, and

he often reminisced about the green, orchard-laden landscape of the pre-technology revolution California.

Consequently, the enclosed park intends to recapture an old-style California vista. Cars, car parks and grey tarmac areas are all banished. Instead, there'll be a green, tree-studded landscape threaded with jogging and cycle trails. In fact, there are plans to have over a thousand bikes permanently on site in a cycle park.

To help emphasise its forward thinking focus, Apple is said to have dismissed claims for a museum, despite various campaigns. As Phil Schiller explained, Apple is "focused on inventing the future, not celebrating the past".

## Environmentally Friendly

To minimise the environmental impact of such a large construction operation, the original plans were tweaked to ensure dirt won't be removed from the area. And Lisa Jackson, Apple's vice president of environmental initiatives, confirmed that 80% of the site will be so-called 'green space'.

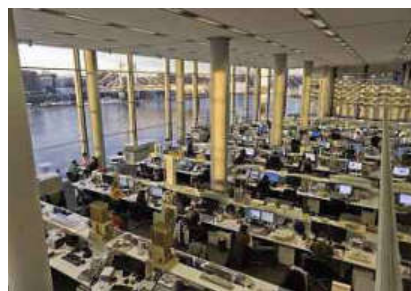
To help recreate a little piece of the original California landscape, Apple hired a leading arborist from Stanford University. In addition to landscaping the whole area, the job involves restoring some of the indigenous plant life, including apricot orchards.

In total, around 7,000 trees will be planted within the campus. But unlike the thirsty, decorative trees sprinkled around other buildings in the area, these will be indigenous, drought-resistant varieties well suited to the dry Pacific climate. The trees will be augmented by other hardy plant species that can flourish in and around the large open expanses of greenery.

## Foster & Partners

Norman Foster and his famous firm ([fosterandpartners.com](http://fosterandpartners.com)) are no strangers to large, iconic, ground-breaking projects – and the public controversy that inevitably surrounds them.

Previous projects include Wembley Stadium, Canary Wharf Underground Station, Stansted Airport, London's Millennium Bridge and Swiss Re tower (the Gherkin), HSBC HQ at Canary Wharf, the McLaren Technology Centre, plus the Hearst Tower in New York and the Shanghai Bank Headquarters in Hong Kong, while airport projects include Hong Kong's Chek Lap Kok and Terminal 3 in Beijing International Airport.



California is currently suffering one of its longest multi-year drought periods. Consequently, water is an increasingly precious resource. Information suggests Campus 2 has plans to extensively recycle water, including a 4km network of pipes to share the water supply between the new site and Cupertino.

Green power is also high on the agenda. Apple is keen to point out that 100% of the energy required for Campus 2 will be obtained from renewable sources. For instance, the top of the circular structure will be fitted with solar panels. With 2km of roof space, the power it can generate will be considerable. However, by itself solar power won't be sufficient, so Apple says additional power will come





from an on-site low carbon Central Plant, which avoids tapping into the Cupertino power grid.

To minimise the need for air conditioning power, the interior of the building is designed to create efficient temperature regulation through natural airflow. In fact, the main building can go without air conditioning or heating for 75% of the year thanks to smart ventilation.

## Construction

Unsurprisingly for such a large project, not everything has gone smoothly. The initial building contractors Skanska and DPR were fired from the Campus 2 site in early 2015. This contract termination meant it lost around \$800 million in revenue. The new contract is with Rudolph and Sletten & Holder Construction.

This change, along with Apple's insistence on perfection in all areas, has pushed the original mid-2015 opening timeframe back to 2016. Smaller satellite buildings will be constructed and opened on a rolling, ad hoc basis. However, so far Apple appears to have no plans to leave its existing Infinite Loop HQ building.

Another problem, albeit a far more predictable one, is that the budget for this new spaceship-like headquarters has ballooned. The original \$3 billion target of 2011 is now expected to be around \$5 billion. As you'd expect, this means Apple has to pacify a large number of unhappy, even angry, shareholders who think the whole project is wildly extravagant. On face value, it seems a huge investment, but in reality \$5 billion amounts to just 5% of Apple's cash reserves.

In contrast to shareholders, the local City Council is very happy with Apple's decision to build Campus 2. The building will boost the council budget by an extra \$30.6 million. It appears around \$8 million of this figure will pay off the city retiree medical unfunded liability and \$8.3 million is being allocated to pavement maintenance. The remainder will end up in the city's capital reserve.

## Competition

Apple is obviously determined to use its vast cash reserves and construct a truly iconic building. Yet a number of other tech companies with deep pockets are also keen to invest in eye-catching HQ buildings.

Google tried to secure a 2.2 million square foot development plot in Mountain View's North Bayshore district to build a massive, sprawling campus. The plan was to cover the buildings and spaces with an ultra-thin glass mesh, which would in effect blur the distinction between the indoor and outdoor areas.

However, a subsequent city planning meeting decided to give two-thirds of the chosen area to a much more modest and straightforward construction plan from LinkedIn, thus foiling Google's ambitions.

Meanwhile, in nearby Menlo Park, Facebook recently opened up a new 430,000 square foot campus. Designed by world-renowned architect Frank Gehry, it encapsulates the world's largest open floor plan, where thousands of people can work and communicate. Employees can also head up to the nine-acre park located on the building's roof, which boasts a half-mile walking trail, over 400 trees, and work areas.

And Amazon is a key contributor to a new-style Seattle office park called South Lake Union. Designed to be an integral part of the cityscape, it will have translucent domes covering 307,000 square metres (three city blocks). These domes, situated between three generic 38-storey office towers and above deeply buried underground parking lots, provide open public access via walkways, cycleways and bus stops. [mm](#)

## Santa Clara Valley

Before the onset of the digital age, the Santa Clara Valley was a very different place. Named after the Spanish Mission Santa Clara, for a while it was known as the 'Valley of Heart's Delight' due to its high concentration of orchards, flowering trees and plants.

Until the 1960s, the valley's warm and sunny climate (it averages 330 sunny days per year) and highly fertile soil created the largest fruit production and packing region in the world and was home to 39 canneries.

All this activity required a large workforce, one which greatly exceeded the local population. Initially, this need was met by Chinese and Japanese immigrants, then later by Italians and others with suitable skills from Southern and Eastern Europe. More recent immigration sources included the Philippines and Mexico.

# Component Watch

**This week, James Hunt turns his bargain-hunting attention to coolers**

**T**he temperature outdoors may be lowering, but that doesn't mean your computer's getting any cooler inside. Whether you're an overclocker trying to stretch that extra bit of performance out of a system or an enthusiast looking to take your cooling to a quieter level, water cooling is the upgrade you need. That's why we've picked out the best prices for every decent entry-level water cooler we could find. Now you have no excuses!

**Deal 1: Cooler Master Seidon 120 v2**  
**RRP: £44.99 / Deal Price: £34.98**

Compact and low priced, the Seidon is one of Cooler Master's most basic water coolers – which means it's still better than almost all fans! Factory sealed with a specially designed 120mm PWM fan radiator that only operates at the minimum necessary fan speed to keep noise levels down, the fan is a strong first choice. It even has a built-in power indicator LED so you can be sure it's working even if the fan isn't moving.

**Where to get it:** Novatech – [bit.ly/1QX9Awm](http://bit.ly/1QX9Awm)



**Deal 2: Antec H20 Kuhler 650**  
**RRP: £39.99 / Deal Price: £36.98**

Probably the least expensive water cooler on the market right now (at retail prices), the Antec H20 Kuhler 650 is a self-contained, prefilled cooler unit that requires no maintenance. It's quieter and more efficient than a standard cooler but no more expensive than a half-decent replacement fan, so it's ideal for budget buyers and first timers – especially at a few quid off retail!

**Where to get it:** Scan – [bit.ly/1LOAtT9](http://bit.ly/1LOAtT9)



**Deal 3: Alphacool Eisberg 120**  
**RRP: £59.99 / Deal Price: £51**

If nothing else, the Alphacool Eisberg 120 proves that just because a cooler is inexpensive, it doesn't have to look cheap. If anything, this is a little too over to the top. Clearly aimed at

gamers and enthusiasts, it's still priced for beginners if you go for this discount. Unusually for an all-in-one design, the pump is located on top of the waterblock rather than in the radiator, so that might make it easier to seat inside more cramped systems, but let's face it, this isn't a cooler you'd want to buy for its practicality.

**Where to get it:** Scan – [bit.ly/1kvkCyl](http://bit.ly/1kvkCyl)



**Deal 4: Fractal Kelvin Design Hydro T12**  
**RRP: £79.99 / Deal Price: £59.99**

The entry-level cooler from the cooling geniuses at Fractal Design, the Hydro T12 might be expensive, but it also has enthusiast-grade components and an expandable system so you can incorporate extra components, customising the cooling system to meet your needs. Cheaper than a pure custom build and with a silent ceramic pump, it's worth every penny you pay, especially if you have a high-end system that you want to reduce the noise of.

**Where to get it:** Novatech – [bit.ly/1NW0nH6](http://bit.ly/1NW0nH6)



**Deal 5: RaiJintek Triton**  
**RRP: £74.99 / Deal Price: £64.98**

The best value 240mm cooler on the market, the RaiJintek Triton features a double-width radiator with two 120mm fans for superior cooling performance, as well as customisable components and a selection of different coloured coolants that you can use. A great choice for enthusiasts who like style as much as substance. Just make sure you have the space for it within your system!

**Where to get it:** Novatech – [bit.ly/1OUy4Yb](http://bit.ly/1OUy4Yb)





# AOC

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# Intel, AMD Post Iffy Results

## Magix Music Maker Goes Live

**Rock on, dude**

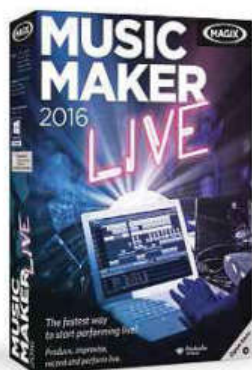
**M**agix Music Maker has stepped up to the plate with the latest versions of the company's music production program.

Music Maker Live 2016 and Music Maker 2016 Live Performer are, as you'd expect, aimed at users wanting to produce music and play it live – no experience necessary. New Live Pads, 16 virtual pads that can be operated and recorded in real time using a keyboard or the Magix Audio Remote app, make creating new tracks a doddle while also allowing for a bit of creative freedom when making electronic music in particular. Unleash your inner Depeche Mode? Oh, alright then.

The package has 30 pre-produced Live Sets in a range of genres (Hip Hop, Deep House, Techno, etc.), and Live Performer comes with USB pad controller

hardware for the Live Pad mode, comprised of a velocity-sensitive keyboard with the 16 multicoloured pads, 25 keys and eight knobs for producing and composing tracks.

Options and features aplenty here (prices start at £44.99 and go up to £139.99). Read all about it at [www.magix.com](http://www.magix.com).



## Swatch Watch's Wrist Pay

**NFC technology brings contactless  
to arms**

**S**wiss watchmaker Swatch has shown off its Swatch Bellamy smart device (fantastic name) in China.

Working with two of the country's banks, Swatch has developed a wristwatch with built-in NFC technology so the user can make payments with a flick of the wrist in shops around the country. The watch is actually named after American writer Edward Bellamy, who saw a world without cash in his writing as far back as 1888. Sorry, David, a watch will surely be named after you in the not-too-distant future.

It's going to be rolled out in China early next year, with launches in the USA and Switzerland to come. No word on any UK activity, alas.





## PC sales take toll

Two of the world's biggest tech firms, Intel and AMD, have recently posted their quarterly results, and the news isn't great.

For Intel, a 6% fall in its net income plus a cut in its forecast for its server-chip business are being put down as a result of slowing demand for its server chips. The traditional PC business is slowing, as everyone knows, but Intel has been

relying on the data server market to help it stay alive. When demand in that area also slows, you get results like this.

AMD might have been afforded a smile at the news, only it's doing even worse from the sounds of things, announcing a fourth straight quarterly loss at \$197m. Time was when these two were fierce rivals. Nowadays, with results like this and a cut in its workforce, AMD is increasingly becoming a footnote in computing's history.



How quickly things can change in the world of technology. Not really that long ago, AMD was riding high, producing affordable, reliable processors that even outdid Intel in the desktop market. Today, we find it struggling to keep up in its core markets, while also failing to find a foothold in its new ones.

Contrast that with Apple. It's hard to believe, but at one point it was practically on its knees, but now it's right at the top of its game and making ludicrous profits.

In fact, it has so much money in the bank, it's building a hugely ostentatious new campus that looks like an alien spaceship and which will no doubt be crammed with shiny technology and other fancy things.

It doesn't seem likely, looking at the situation now, that AMD will ever be able to reverse its fortunes and build its own 'spaceship', but as Apple's case proves, you can never be sure what's going to happen in the future...

*Anthony*

Editor

# AVG Updates For Windows 10

## New features, better cleaning for performance boost

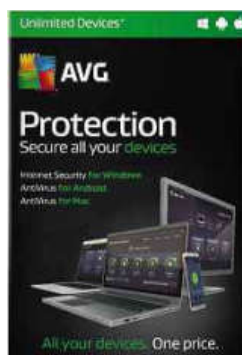
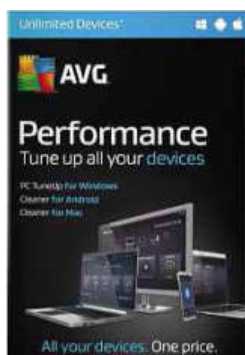
AVG has refreshed its Protection and Performance products to offer full support for Windows 10 systems. Not only that, but there's the usual bunch of new features and improvements you'd expect any company to furnish their new products with.

Starting with AVG Protection, available in both Free and Pro versions, this includes AVG AntiVirus for Windows, Android and Mac systems, which features Real-Time Cloud Detection for instant spotting of malware outbreaks, improved Online Shield (in the Pro version) for better cloud-based detection of dangerous downloads, and better Battery Save mode for Android users by allowing them to switch on the mode directly from within the phone's notification panel.

Moving on to AVG Performance, that suite includes PC Tune Up improvements for better performance, with a better browser cleaner and PC cleaning, a new App Manager for Android users to

get an overview of which apps are causing most drain on your system, and iPhoto Cache cleaning for Mac users to clean up much-needed space and prevent the need for photo cleaning over time.

Both packages are available to buy now or can be trialled for 30 days if you'd prefer to try before you buy. [www.avg.com](http://www.avg.com) is the website where it's at.



# Meanwhile... On The Internet...

**B**ack in 2013, Google's Eric Schmidt – now Alphabet's Eric Schmidt – tweeted that by the end of the decade, everyone on earth would be connected to the internet. He may yet be proved right, but it's starting to look unlikely. According to a new report from the World Wide Web Foundation ([tinyurl.com/nu8dtoa](http://tinyurl.com/nu8dtoa)), women in developing countries are 50% less likely to use the internet than men in the same communities, even when they have access to the technology.

That's a pretty massive gender divide, and one that looks to be tricky to bridge. The report looked at populations in various developing countries, including Uganda, Kenya and Nigeria, and found that though internet usage is more widespread than might be expected in impoverished communities, it's largely only young, educated men who access it. Women in the same age and household income group are just not going online – even in communities where men and women are equally likely to own mobile phones.

What's stopping them? Well, the World Wide Web Foundation reckons it comes down to education; women who have at least some secondary education are six times more likely to be online than women who only went to primary school. To try to close the gap, the foundation is recommending that schools should teach digital skills from primary level onwards; that governments take legal action to combat harassment of women online; and that various government agencies work together on the problem, since there are clearly cultural factors at play that can't be fixed by just installing broadband networks everywhere. Seems like a tall order, with only five years left for Schmidt's prediction to come true...

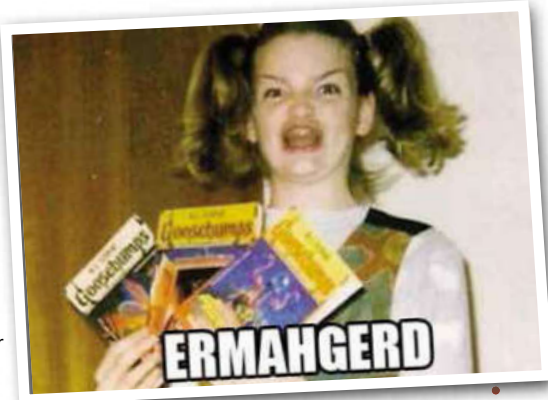
**T**hose of us who do have access to the internet might want to heed a recent warning to be careful about what we post online: this week, two teenage boys faced possible jail time after posting photos taken inside Bristol Crown Court on Facebook.

The photos in question showed the judges presiding over a murder trial. In the Facebook posts, the kids ridiculed the court officials and praised a convicted murderer for being a "gangster".

That might sound like typical teenage bravado, but it's illegal to take photographs of anyone inside a court of law, and it carries a penalty of up to two years in prison.

The boys' lawyer asked the court to be lenient, given their age, but it looks like the judges are determined to make an example of them. Mr Justice Irwin said, "These matters are serious. The facts demonstrate the increasing difficulties faced by the criminal courts, derived from access to social media."

Now, we're not suggesting any Micro Mart readers are likely to go abusing judges online, but this case does seem to highlight the way online conduct is now being taken seriously in real life. There's no 'it's just the internet' argument any more; what we do online is now, well, what we do.



**S**peaking of things posted on the internet, the origins of two different memes popped up online this week.

The first was a profile of the 'Ermahgerd Girl' in Vanity Fair ([tinyurl.com/p6l8a3x](http://tinyurl.com/p6l8a3x)). You've almost certainly seen the image in one form or another: it's a picture of a pre-teen girl with pigtails and braces, grinning madly and holding up three *Goosebumps* books, and it's generally accompanied by a misspelled caption expressing lispish enthusiasm.

The meme has been around since 2012, and it's always seemed a bit mean-spirited. According to Vanity Fair, though, the girl in the picture was in on it all along. Maggie Goldenberger took the picture as a joke; it was never an actual expression of geeky joy, just an impression of one. It became a meme when one of her friends uploaded it to Facebook as an in-joke; a friend of a friend found it without knowing the background and posted it to Reddit.

Does knowing it was always a joke make it less cruel? Not necessarily. Those of us who actually were over-excited gawky tweens might feel even more put out; even the Ermahgerd Girl was taking the mickey.

The other meme backstory that came out this week was the one behind #FutureDay ([tinyurl.com/obzgp92](http://tinyurl.com/obzgp92)). In 2010, a still image purporting to be from *Back To The Future Part II* showed that 5th July 2010 was the day Marty and the Doc travelled to in the movie, and everyone got all nostalgic for their favourite time-travelling movie franchise.

However, it had actually been Photoshopped as a bit of promo for *Total Film* magazine. The guy behind it, Daniel Dalton, never intended for people to think the image was real, but it went viral, and before long he'd unleashed a plague of #FutureDays on the internet. Various other jokers have changed the date and reposted the image over the years, hoping to fool enthusiastic (but unobservant) *Back To The Future* fans.

The funny thing is this week really was #FutureDay. Yup, the year of hoverboards and *Jaws 19* is upon us: Marty travelled to 21st October 2015, which means we officially live in the future. Hurrah!

## .AVWhy?

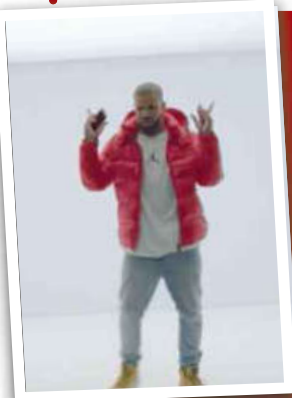
Videos For Your Eyes...  
Not Necessarily For Your Brain

This week, singer-songwriter-rapper Drake released the video for his single 'Hotline Bling' ([tinyurl.com/px89b4g](http://tinyurl.com/px89b4g)). As videos go, there's not much that's remarkable about it – except Drake's dance moves, which immediately prompted a hashtag,

#DrakeAlwaysOnBeat and a spate of

brilliant parody videos showing Drake getting down to some inappropriate (but strangely well synchronised) music.

For my money, the best include Drake doing the Monster Mash ([tinyurl.com/qzzb4j9](http://tinyurl.com/qzzb4j9)) and Drake dancing to the Star Wars Cantina Band theme ([tinyurl.com/qdetnxx](http://tinyurl.com/qdetnxx)), but there seems to be no end to the number of things Drake can dance to. Want proof? Check out the hashtag ([tinyurl.com/qfrjz9n](http://tinyurl.com/qfrjz9n)).





## Caption Competition

"So this isn't what you meant by striping my hard drives?"



Stripes are slimming, if you believe people who say that kind of thing. Actually, maybe it's black that's slimming. Or dots. We're not sure, to be honest. Personally, we just suck in our gut and keep it like that until whoever it is we're trying to impress leaves the room.

Anyway, captions...

- **Thomas Turnbull:** "Never commit identity fraud with a zebra."
- **doctoryorkie:** "Netbooks in 2015? Criminal."
- **doctoryorkie:** "Newcastle fan? Looking at the table? Then save time by using the page down button instead of scrolling."
- **Dan Hall:** "So this isn't what you meant by striping my hard drives?"
- **Glen Baker:** "Reading between the lines."
- **Richard Tree:** "Unlike her clothes, the web isn't all black and white."
- **Mark Handley:** "I may be serving ten years, but on the plus side, I just found the Any key."
- **Terry Martin:** "Sadly, none of these keys will open my cell."

Thanks for those, lovely people, but an extra thanks goes to our winner this week, Dand Hall, whose caption you can see up there in the white bubble thing. Good stuff, Dan.

To enter this week, head to the 'Other Stuff' section of our forum ([forum.micromart.co.uk](http://forum.micromart.co.uk)), or email us your funnies via [caption@micromart.co.uk](mailto:caption@micromart.co.uk), remembering to add the issue number to the email subject line.



# Apple Ordered To Pay Up

## Patent infringement case hits hard

Apple has been ordered to pay damages of over \$234 million for patent infringement.

The jury awarded the damages in a case relating to the Wisconsin Alumni Research Foundation with the decision that Apple had used patented

microchip technology in some iPhones and iPads without having any permission to do so. Apple, of course, will be appealing the decision, although the sum is way lower than the \$862m the foundation actually wanted, as the judge ruled that Apple's infringement wasn't wilful.

# Virgin Media Trials Smart Pavements

## Buckinghamshire locals put their best feet forward

The smart city is evolving. Virgin Media is trialling free public wi-fi in the form of smart pavements, which is essentially some wireless routers underneath manhole covers that are then wired directly into the firm's core network.

Virgin is claiming in its press release that residents in

Chesham are benefitting from speeds up to 166Mbps and, also according to the company, the system has a range of around 80 metres from Virgin's high-street cabinets. The manhole cover's have specially designed resin covers to allow the signals to work. Smart pavements, eh? Whatever will they think of next?



## Snippets!

### Dropbox Launches Paper Beta

File-hosting site Dropbox has made a move into the collaborative note-taking field with the beta launch of Dropbox Paper. Billed on its site with the strapline "Capture and build on ideas, together", this is intended to allow multiple users to work on a document at the same time, and it's obviously the same kind of thing other services are already providing.

Sign up to the waiting list if you're interested at [www.dropbox.com/paper](http://www.dropbox.com/paper).

### Uber Launches Above The Border

There's been controversy as taxi service Uber has launched in Glasgow. More cities are planned in Scotland over the next year, and there are reportedly hundreds of drivers signed up to work for the firm. The move accounts for Uber's biggest location launch, as 20,000 people apparently downloaded the app in anticipation of the service landing in the country, and the move will no doubt anger those who oppose the service Uber is offering.

### Parents Worry About Kids: Shock

Did you know that during an average weekend, a child typically sends and receives more than 100 emails, texts and instant messages? In light of this, it's perhaps not a huge surprise to learn that six out of ten parents monitor what their children are up to on their mobile phones, according to research from Bullguard.

The study revealed that one in five parents don't trust their kids online and suspect that they might be looking at inappropriate content, while a quarter said that they were shocked when they read emails and messages on the likes of Facebook.

# Sainsburys Shuts Down Mobile Service

## Two years and out

**S**ainsburys, that purveyor of all things, erm, well supermarket-y has only gone and closed its mobile phone service. After just two years, the supermarket chain has decided to call it a day for its virtual network (Vodafone provided the guts of the service, really), and, according to the BBC, the partners won't be continuing the relationship beyond January. The BBC also reported that Sainsburys didn't want to just end things here

and that it could be looking into alternative options to keep things up and running. In its current form, though, it looks like it's finished.

Considering the vast customer numbers at its disposal, presumably take-up wasn't strong enough to stop Vodafone from deciding to walk away. As for existing customers, contact Sainsburys before January for your PAC code if you want to take your phone number with you.

# Over 12 Million Lack 'Digital Era' Skills

## Warning over digital exclusion

**A**ccording to a charity promoting digital skills, over 12 million people plus over a million small businesses in the UK don't have the requisite skills to manage well in the digital age.

The charity Go ON UK has produced a Digital Exclusion Heatmap of the UK, and it seems that Wales fares the worst, as over a third of the country's population don't have the basic skills needed. There are five core skills,

according to the charity: manage information, communicate, make payments, solve problems and being able to create things online. If you have all of them, then the charity says that you're going to be just fine in the digital age. If you don't have all five of them, the future looks a little less rosy.

Men are marginally more likely than women to have the requisite basic skills for the digital world too, according to Go ON UK's data.



# Amazon Sues Fakers

**What do they say? Never tell fibs**

**N**ow this is pretty big news. Amazon has decided that enough is enough, and it's announced legal action against more than 1,000 people who've posted fake reviews on its site. The Washington-based lawsuit claims that it's damaging to its brand reputation as fake reviews paid for by sellers is affecting customers' buying decisions.

The claim in the lawsuit is that the defendants are offering false, five-star review services on Fiverr.com, and it's come about from Amazon's own investigation into the matter. For its part, Fiverr.com is reportedly working with Amazon to resolve matters, and we wouldn't like to be in the shoes of anyone taking part in this practice, frankly.



# Apple Music Hits 6.5 Million Subscribers

**Tim Cook's happy**

**A**pple Music won't be everybody's cup of tea (heck, Apple isn't everybody's cup of tea), but it's done enough to silence any fears that it might not take off.

According to Apple's Tim Cook, in a talk he gave at a tech conference in California, the music service now has over 6.5 million paid users.

That's not a bad take-up from the trial period, although it remains to be seen how many of the 8.5m people Cook says are also still currently trialling the service will be added to that figure.

Apple was wise to lay on a 90-day free trial for users before they had to commit to anything financially, and it does seem to have paid off, initially at least.

# Wii U Follow-Up Development Kits Already Available?

**Wall Street Journal claims console is in the works**

**E**veryone loves a bit of speculation, so we thank the Wall Street Journal for citing "people familiar with the matter" for the paper's story suggesting that Nintendo has already begun issuing development kits for its next console.

The paper claims that the console, tentatively known as NX at this stage,

will integrate a traditional console with a mobile unit for use in conjunction with the main console, or possibly something entirely separate from that. Other than that and a few tasty morsels about 'industry-leading chips', there's little information here, really. Still, Nintendo's next move could be coming sooner than we thought.

# 1TB Surface Book Listed At Microsoft

**Yours, for just \$3,000**

**H**ere's something for your Christmas wish list. Microsoft has followed up its initial announcement of the Surface Book with a listing of a 1TB version of the laptop/tablet hybrid at its US store.

The 1TB version will house an Intel i7 processor and 16GB RAM, so it's a powerful fella, on paper. It's also a pricey one, at \$3,199 – that's a little over £2,000. Not

cheap, then. Not cheap at all. But hey, other options are available and Microsoft will doubtless get plenty of people who are keen to buy right across the Surface range.



# Code With AI2

## Speech Memo (Part 2)

### Build an enhanced Android speech-enabled memo app with David Briddock

Last time, we used App Inventor 2 (AI2) to build a voice-enabled memo app, which took advantage of the speech recognition component. However, there was room for improvement. In particular, if the app is closed or the device turned off, the memo list is lost. In addition, it wasn't possible to delete a memo. Let's fix both these problems now.

Remember, all you need to play along is a Windows/Mac/Linux PC, web browser and Google account. This time, you'll also need an Android smartphone or tablet to test the app.

#### What We'll Learn

To stop our memos disappearing, we'll need to save the memo list in a persistent data storage file or database.

With this in mind, we'll be peeking into the Storage group and briefly evaluating the various AI2 data storage options.

In addition, we'll take advantage of the touch event support built into the

ListView component to trigger our delete memo behaviour.

#### Starting AI2

In your browser navigate to the AI2 home page ([ai2.appinventor.mit.edu](http://ai2.appinventor.mit.edu)) and sign in with your Google account.

Select the My Projects menu option, and open the project we created last time, namely the one called 'MMSpeechMemo'.

We're automatically placed in Designer View mode, and here we can see the MemoList, AddButton and SpeechRecognizer1 components that we added to Screen1 last time. There's nothing we need to modify here in terms of properties, but we do need a few more components.

#### Data Storage

As mentioned above, we need a data storage component. There are two main choices: a simple File or the

more flexible database (TinyDB or TinyWebDB).

A database stores various kinds of data, each with its own tag. However, our speech memo app only needs to store a list of simple text strings, so the File option is just fine.

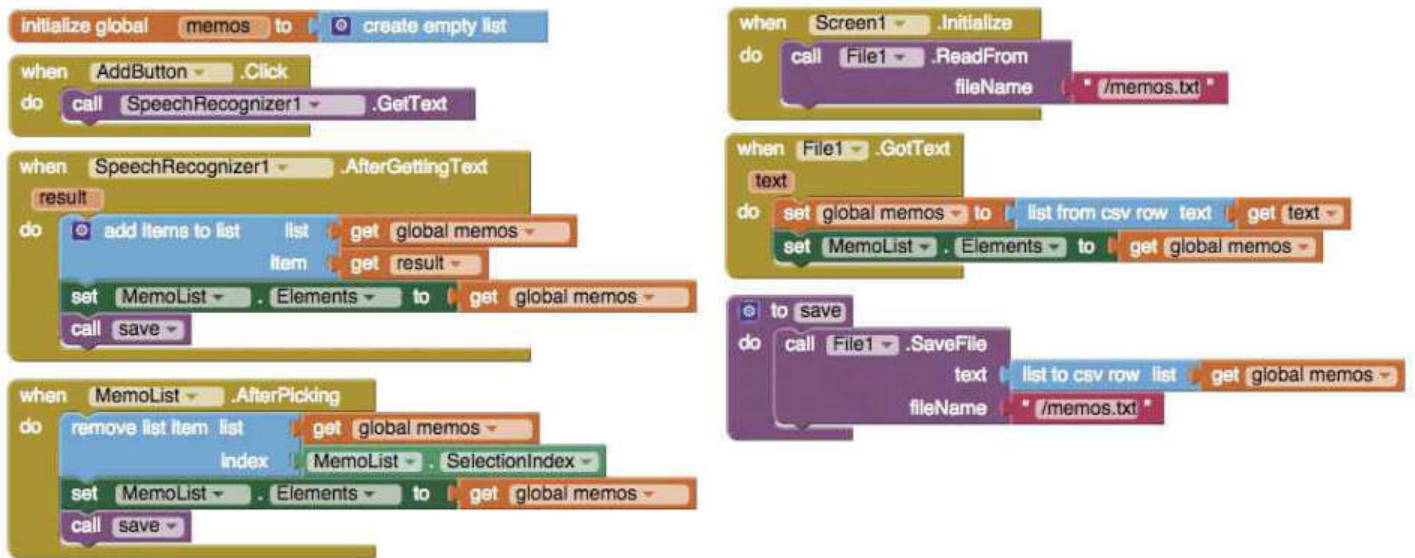
From the Storage group, grab a File component and drop it onto the Screen1 area. Notice that it appears in a Non-visible Components area underneath the screen as well as in the Components panel.

#### Tap To Delete

It's time to start coding, so click on the Blocks View button located on the green bar.

We're going to delete a memo list item with a simple tap. First grab a brown 'when MemoList.AfterPicking' block from the MemoList component and drop it into the Viewer panel's coding area.





▲ AI2 blocks view

Now grab a cyan 'remove items to list' block from the List group. This needs two values. Set 'list' with an orange 'get global memos' block from the Variables group. Then set 'index' with a light green 'MemoList.SelectionIndex' block from the MemoList component.

Now to update the displayed memo list. Grab a green 'set MemoList

string will be separated by a comma. Grab a cyan 'list to csv row list' block from the Lists group and snap it next to 'text'. Now grab an orange 'get global memos' variable block and snap it onto the end.

Next we'll set the 'filename' value. Something like 'memos.txt' seems appropriate. However, the filename

component and drop it into the coding area. Inside, snap a purple 'call File1.ReadFrom' block, with its filename value set to the text string '/memos.txt'.

Finally we need to handle the file read event. Grab a brown 'when File1.GetText' block from the File1 component and drop it into the coding area.

Inside, we'll first set the global memos variable. Use a cyan 'list from csv row text' block, then hover over the parent block's 'text' attribute to set its value with a 'get text' block. The second block just updates the MemoList component as we've seen twice before.

And that's the coding done. Ensure the warning and error counts in the bottom left are both zero, then carefully check your code against the Blocks View image.

## Testing

Test with the AI Companion App installed on a real Android device (as we discussed earlier in the series). You'll also need to be connected to the internet.

Side-load the finished app onto an Android device ([goo.gl/ZMKgAe](https://goo.gl/ZMKgAe)) so it's just a tap away the next time you need to quickly create a memo or shopping list.

## Going Further

As always, there's scope for further refinement. One useful modification would be to pop up a confirmation dialogue after a memo list entry has been tapped (hint: see Notifier in the User Interface group). This would avoid deleting a memo by mistake.

Next time, we'll build a multi-language translation app. [mm](#)

## “ We'll need to save the memo list in a persistent data storage file or database ”

Elements' block from the MemoList component and snap it under the cyan block. To set its value, grab an orange 'get global memos' block from the Variables group.

### Save Procedure

We have a File storage component, but when should a save occur? The answer is whenever a new memo is added to the list or an existing memo is deleted. This means we need the same code in two places, so let's create a procedure.

Drag and drop a purple 'to procedure' block from the Procedures group into the coding area. Change its name from 'procedure' to 'save'. Next grab a purple 'call File1.SaveFile' block from the File1 component and snap it inside.

There are two values required for 'SaveFile' to work, namely 'text' and 'filename'.

For 'text' we're going to provide a comma separated value (CSV) data string. In other words, each memo text

must also indicate the host folder. For now we'll specify the root folder with a '/' character prefix. Grab a simple text value block from the Text group, set the text string to '/memos.txt' and snap it into position.

### Calling The Save Procedure

As we mentioned earlier, the 'save' procedure is called from two places.

Grab a purple 'call save' block from the Procedures group and drop it into the brown 'when SpeechRecognizer1.AfterGettingText' block. It needs to be the last block, namely just after the green 'set MemoList.Elements' blocks.

Now repeat the process, but this time drop it into the brown 'when MemoList.AfterPicking' block, once again positioned as the last block.

### App Initialise Code

When our app starts, we want to see the list of saved memos. Grab a brown 'when Screen1.Initialize' block from the Screen1

## DCP-9015CDW

While not an all-in-one device, this multifunction product still has a few tricks up its sleeve

### DETAILS

- Price: £226.80
- Manufacturer: Brother
- Website: [www.brother.co.uk](http://www.brother.co.uk)
- Requirements: Windows XP or later, Mac OS X 10.6.8 or later

The Brother DCP-9015CDW brings together the functionality of a colour laser printer and an A4 flatbed scanner. Along with the main scan and copy features, this Brother multifunction product offers remote and duplex printing, plus a choice of USB, wired or wireless connectivity. This sturdy device, with dimensions of 410 x 483 x 410mm (W x D x H) and weighing 23.2kg, will certainly be more at ease in an office rather than a home environment.

The DCP-9015CDW sandwiches the colour laser printer module between an A4 flatbed scanner and an enclosed paper tray, that's capable of holding 250 sheets of paper. Unfortunately, due to the closed nature of this tray, it's not possible to check on the available paper level without pulling the tray open. This omission could result in running out of paper midway through a print run, which isn't ideal but isn't a deal-breaker either. Printed documents are ejected into a deep set opening positioned above the printer unit.

Located between the paper output opening and the scanner module is a 9.3cm colour touchscreen and a keypad that only appears when it's needed. This control feature provides



“ The lack of an automatic document feeder might puts off some buyers ”

feedback and status information as you make adjustments to the settings used by the product. Generally, this system worked well in our test, but there was one occasion when the positioning of the OK button, tucked away in a corner, meant it was not as responsive as it could have been.

This colour laser printer requires four cartridges covering black, yellow, magenta and cyan toner. The cartridges come pre-installed in the belly of the printer. However, you'll have to remove each one before detaching a covering plastic protective shield and then replacing each cartridge in the relevant slot. The cartridges and

slots bear the appropriate colour so as to avoid any mix up.

As is Brother's usual practice, this multifunction device comes with a software CD containing drivers, utilities and a PDF version of the user manual. When installing the main MFL-Pro Suite package, you'll be led through making a choice of USB, wired or wireless connection to a computer following on-screen instructions. In the case of the first two methods, you'll need to provide the appropriate leads. A wireless connection can also require a USB lead for the initial stages, but this process can be avoided if your router supports WPS or AIOSS.

When printing documents, the supplied driver gives a choice of normal or fine quality, with the former set at 600 x 600dpi and the latter at 2400dpi. Other options include selecting the document type and size of paper, plus whether to opt for toner saver and duplex printing, with a choice of print profiles. If none of the supplied profiles suits, then new ones can be created for specific print runs.

Using a choice of document styles, including one with a full page picture, I was able to duplicate Brother's claim of 18ppm with the normal print settings. Print speed dropped slightly to 17ppm with fine quality. With duplex turned on, a 6,090-word text document was printed double-sided on six pages in 97 seconds. There's also support for remote printing using the iPrint&Scan app, AirPrint and Google Cloud Print.

Checking out the Brother website revealed that replacement cartridges are priced at £73.39 for black (2,500 pages) and £71.99 for each colour (1,400 pages).

The lack of an automatic document feeder, however, might puts off some buyers from an otherwise well specified product. **mm Michael Fereday**

**A decent, all-round printer, with a few flaws**





# Pinnacle Studio 19 Ultimate

A trio of new/upgraded video editing solutions from Pinnacle

## DETAILS

- Price: £ 99.95
- Manufacturer: Pinnacle
- Website: [www.pinnaclesys.com](http://www.pinnaclesys.com)
- Requirements: Windows XP or later, dual-core 1.8GHz CPU, 4GB RAM, 8GB disk space

If you've ever dabbled in video editing, you'll certainly have heard of Pinnacle's Video Studio, which is now in its 19th edition. Recently updated, the program is available in three versions: Studio, Studio Plus and Studio Ultimate.

This review covers the Ultimate edition, which is the most expensive but, as you might expect, has the most features and comes with bags more content. In fact, it has more content than any other editor I've ever seen. To give you some idea, you have over 1,500 transitions to choose from. These include the usual wipes, fades and dissolves, as well as things like rotating, collapsing boxes and two clips changing place while rotating around a planet (I kid you not!).

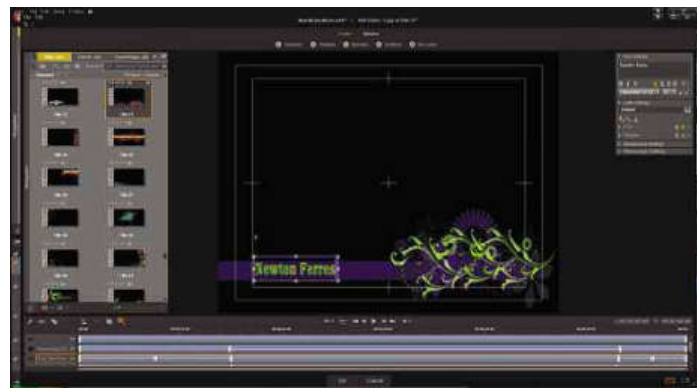
Then there's an equally comprehensive range of video effects that, like the transitions, can be previewed by clicking on them.

Finally, you get a huge collection of audio clips, covering every sound effect you could wish for, together with a brilliant selection of background music. This is also more than it seems, because each audio track can be changed almost infinitely in the ScoreFitter. As the name implies, it's a utility to subtly alter the base track in terms of its tempo and genre.

You can also stretch the audio



▲ A very simple drag and drop interface



▲ The title editor is comprehensive

file to fit your production, and in a few seconds, ScoreFitter will render it automatically for you. This really is a massive collection, but like all digital effects, they should be used with some restraint; less is sometimes more.

This latest version of PVS is nothing like the last one I looked at. The new interface is typical of modern video editors, with a timeline along the bottom of the screen, below a project bin and preview monitor. Clicking the tabs along the top of the project bin reveals the transitions, effects, titles and other content.

Incidentally, these are not fixed tabs; you can add or remove them to suit your current project.

To assemble your video, you simply drag and drop the files onto the timeline adding titles, transitions, effects and audio in

the same way. Once in position, you can edit them in terms of length and content. In the case of titles, there's a more comprehensive editor to change everything from the font to the text style and colour – even the way the letters will animate onto the screen.

After completing your projects, you'll naturally want to save them in a suitable format. Here again, there's a wide range to choose from. The MyDVD Disk Menu includes a selection of menu templates covering DVD, Blu-ray and AVCHD, with output formats up to 4K. It also provides a range of format types to suit the final playback device.

Finally, for who that are already familiar with PVS, what's new in this version? Well, my last paragraph was a bit of a clue,



because the program can now handle 4K video files. Naturally, you'll need a system that can cope with the increased file sizes, but I guess if you're into video editing, that's a given anyway.

In my opinion, one of the most important additions is the move to 64-bit architecture. The performance increase on display and rendering this gives is outstanding. Other additions include multi camera editing, so you can edit footage from two different cameras while keeping the clips aligned and audio synced. On top of that, you can multi-layer using up to six audio and video tracks.

Pinnacle obviously thought all the content I mentioned earlier wasn't enough, so it's added a 30-day, all-access pass to StudioBacklot.tv, featuring brand-new Pinnacle Studio 19 content and loads of Video Studio training. Incidentally, this is not the usual mediocre giveaway stuff you get with some products; we're talking top-quality training and files that are well worth having.

**mm Joe Lavery**

**Simple to use and fantastic value for money**



# WebSite X5 Evolution 12

A new release from Incomedia of its flagship WebSite X5 website designer

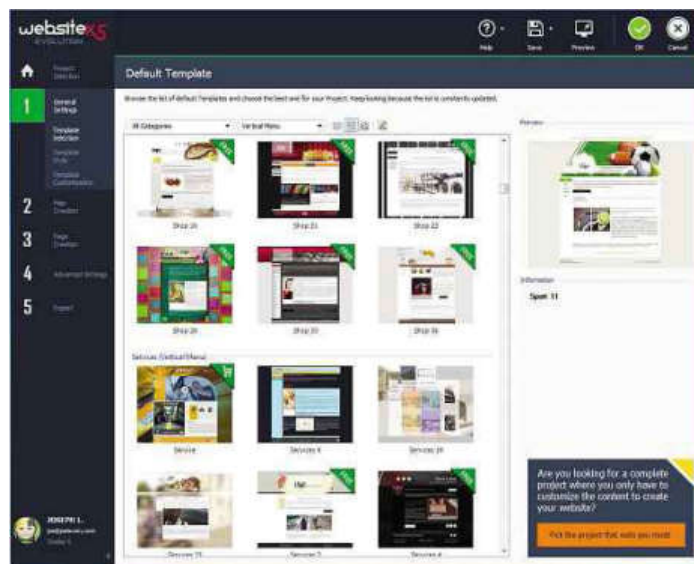
## DETAILS

- Price: WebSite X5 Professional £ 139.00, Price WebSite X5 Evolution £ 49.99
- Manufacturer: Incomedia
- Website: [www.websitex5.com/en/create-your-website.html](http://www.websitex5.com/en/create-your-website.html)
- Requirements: Windows XP or later, 1GB RAM

This month sees the latest update from Incomedia of its WebSite X5 product line, adding another digit to make it the 12 edition. It's also reduced the Evolution version to £49.99 and the Pro version by £30 to £139.00 – something to factor in when you're looking for a website designer. In fact, the company encourages potential users to try it out first before parting with their money.

WebSite X5 Evolution is unusual in a number of ways. Firstly, the company allows you to install it on two machines at the same time, and secondly there are no restriction or licensing fees regardless of how many websites you create with it. That applies equally to designers who have clients and charge them for the service, which is quite an important and money saving consideration, compared to other design solutions.

Yet the main difference between X5 and other web designers is its simplicity, making it one of the easiest and productive products to get to grips with.



▲ With more than 1,000 templates to choose from, it shouldn't be difficult to get started

Like previous versions, the interface is uncluttered, using a five-stage approach to designing, which at first I found a little restrictive. But after using it for the past couple of years, I appreciate the versatility and compact code this method provides. It also makes you think more about the layout of the pages, while creating an underlying structure that is easily changed.

This release includes more than 1,000 templates to choose from, and I see that many of these include the full screen background images that are becoming increasingly popular. And if that's not enough to get your creative juices flowing, you also get access to more than 400,000 royalty free photos, buttons and ready-to-use widgets.

As you might expect, Incomedia has an ongoing programme of development, and with this release it has introduced some new features and updates. But possibly the most significant of these is

the introduction of responsive websites. This option is selected when you define the general setting at the beginning of each project. Once checked, it creates websites that automatically adapt to the format of the device being used to display them. So it doesn't matter whether you're using a desktop, tablet or smartphone; the content will be presented in a clear and accessible manner. I've seen this feature attempted on other web design programs and, to be honest, it's something of a hit and miss affair, but in the tests I made, X5 Evolution did a good job of it. I think that's mainly due to the way the program optimises the content anyway, so this is just another stage in that process.

Other new features include the introduction of a new Entry Page to your website, which allows you to present the site in different languages. Alternatively, you can use this to

detect the visitor's web browser language and point them to the correct website version.

As you probably know, there are laws in place in most countries regarding privacy protection, where in many cases you're required to inform the user of your policies, particularly if you're using cookies. Well, Incomedia has added a new section to the advanced settings, where you can manage these statements. There's also a facility during page creation to add the reCaptcha system to your email forms, in an effort to keep spam emails under control.

The Pro version has more advanced options for order and stock management, which includes a new online control panel where you can check orders and stock levels from your mobile phone.

If you want to try either of these products for yourself, the Incomedia website has a 14-day trial version, which is free to download. There are also a range of video tutorials to get you started, which supplement the comprehensive manual.

**mm Joe Lavery**

**A well-rounded product to rival any web design system**





# Trendnet Home Smart Switch with Wireless Extender

A networking device, with a little something extra

## DETAILS

- Price: ~£30
- Manufacturer: Trendnet
- Website: [goo.gl/fe2b20](http://goo.gl/fe2b20)
- Requirements: Any modern browser for administration page, Android or iOS device for the app



▲ The wireless extending capabilities of it are certainly good enough



▲ The addition of a home automation function is a stroke of genius

The Trendnet Home Smart Switch is designed to bridge the gap between a network wireless extender HomePlug and a smart electrical outlet.

It's designed for use with a number of home automation projects or simply just one remotely operated and automated item of houseware. For example, you can be sitting there enjoying the extra stretch of your home wireless coverage, when you decide to switch on the radio in the kitchen. Provided the Home Smart Switch is configured as correctly, a single tap on the accompanying app will power up the radio.

On one side, we have the wireless extension function, capable of supporting 802.11b/g/n standards and WEP and WPA/WPA2-PSK encryption. The pair of internal antennas do a surprisingly good job and manage to spread the wireless signal another four or five metres before the signal once more drops out of range.

Setting it up is easy enough: all you need to do is plug the Home Smart Switch in, press the WPS button on your

router and the one on the Home Smart Switch and away you go. For those who don't have WPS capabilities, the Home Smart Switch comes with its own SSID and wi-fi key, as well as a management login IP address, so you can manually connect it to your existing network. It takes a little longer, naturally, but the result is the same.

The Smart Switch side of things takes on a more interesting role, in that you can begin to toy around with the accompanying app, for both Android and iOS devices, and create some scheduled powered control functions.

The Home Smart Switch is effectively the same as another wireless HomePlug, in terms of its appearance. There's an electrical pass-through plug dominating the front of the device, with power and wi-fi LEDs, and the WPS button below. The side of the Home Smart Switch has a traditional power switch, which seems like an odd design decision, since one of the main features of the

device is automation when you're not actually at home; the opposite side houses a pin-hole reset.

When you've installed the Trendnet app and plugged in the radio, lamp or whatever else it is you want to automate, you simply tap the large power button graphic on the app (coloured red for off and blue for on), and the Home Smart Switch will toggle the electrical load to the plugged-in item. And of course, you can activate the plugged-in item from wherever you are in the world via your phone and by allowing it through your router.

Beyond that, you can also set up a schedule to power up a device when you're not there, such as a lamp to make it look like you're at home or as an alarm to wake up to. And the app has the ability to monitor how much power the plugged-in item is using in real time.

The Trendnet Home Smart Switch is certainly an interesting device. Aside from

being a decent enough wireless extender, it's a first step device into the world of home automation or at least home security.

Priced at around £30, it's not too expensive to try out either, even if it's just to extend your wireless signal. It would be interesting to see where Trendnet takes this next. Perhaps a wi-fi extension smart four-way power gang setup?

**mm David Hayward**

**A handy wi-fi extender and home automation device**



# HP Pavilion Mini Desktop

HP bowl into the small media PC market with the Pavilion Mini

## DETAILS

- Price: £349
- Manufacturer: HP
- Website: [www.hp.com](http://www.hp.com)
- Requirements: Keyboard, mouse and monitor
- Model No. 300-030na

Given the power they put in smart TVs these days, I do wonder if the classic media PC is redundant. Nevertheless, lots of hardware makers still produce them.

The latest company to be inspired by Intel's low-power chippery is HP, with its uniquely styled Pavilion Mini Desktop. It makes a range of these, starting at about £250 for the Pentium-powered 300-020na, and progressing up to the Core i5 300-050na at about £450. It's chosen not to do a 'bare bones' version, so they all come with a surface-mounted processor, installed RAM and a hard drive.

The 300-030na reviewed here falls neatly in the middle

at £349, and it uses the Intel Core i3-4025U with Intel HD Graphics 4400 (1.9GHz, 3MB cache, two cores).

Truth be told, this is an older CPU design, being a 22nm Haswell-ULT generation that first appeared in April 2014, but it's reasonably efficient and doesn't yet have a Skylake replacement.

What I immediately noticed

about HP's design was that it hasn't gone overboard with the 'mini' aspect in its noodle-bowl-inspired casing. It's significantly larger than the Intel NUC or latest Zotac Zbox designs, though this does allow for better air circulation.

Internal access is via three screws on the base, and then you can get to the SoDIMM memory slot and the 2.5" drive in a relatively straightforward way.

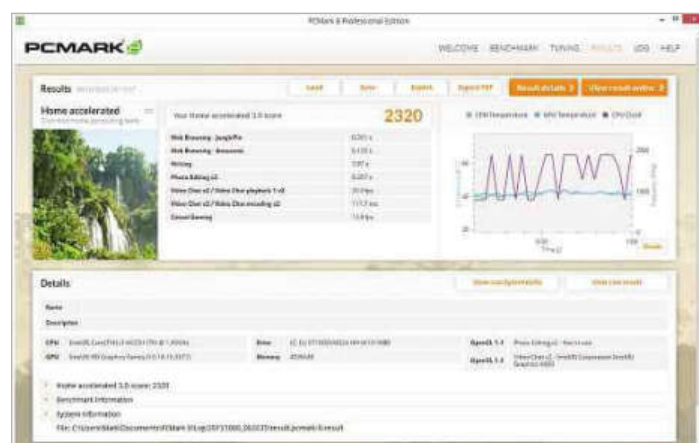
My only real disappointment here was that there's no micro-

SD or M.2 module, so the only realistic internal storage upgrade is to swap out the drive for a 2.5" SSD. I'd seriously recommend that anyone who buys one of these does that, because the preinstalled Seagate ST1000LM024 (a rebadged Samsung Spinpoint) 1TB drive isn't that quick, even if it has tons of capacity.

There's one memory slot, occupied by a 4GB DDR3L module in this case, which I'm reasonably sure you can

## Specifications

- **Operating system:** Windows 8.1 64-bit.
- **Processor:** Intel Core i3-4025U with Intel HD Graphics 4400 (1.9GHz, 3MB cache, two cores).
- **Memory:** 4GB DDR3L (1 x 4 GB); Total slots: 1 DIMM.
- **Storage:** 1TB 5400rpm SATA.
- **Dropbox:** HP Connected Drive1.
- **Display:** LCD monitors sold separately.
- **Network interface:** Integrated 10/100/1000 gigabit Ethernet LAN.
- **Wireless connectivity:** 802.11b/g/n (2x2) and Bluetooth 4.0 combo.
- **Video:** Intel HD Graphics, 1 HDMI, 1 DisplayPort.
- **Ports:** 4 USB 3.0, 1 headphone/microphone combo, 3-in-1 memory card reader.
- **Power:** 45W AC power adapter.





substitute for an 8GB one if required.

Where this design does better is in respect of the available ports – something that often gets overlooked on small machines. There are no less than four USB 3.0 ports, both HDMI and full size DisplayPort, plus a 3-in-1 card reader. It also has excellent networking though a gigabit LAN port, and a wireless module that combines 802.11b/g/n and Bluetooth 4.0.

Included in the price is Windows 8.1, though obviously that can be upgraded to Windows 10 for free for at least the next nine months or so.

And this is the point where my generally approval of what HP had done with the Pavilion Mini took something of a beating. For whatever reason, there are parts of HP that never got the memo entitled 'users hate crapware', because this machine is armpit deep in it.

Evernote, Cyberlink, McAfee, WildTangent, Foxit, Bonjour, Snapfish and Dropbox are all on here, along with HP's own collection of commercial opportunities. It took me almost an entire day to install the 160-odd updates to Windows 8.1, so the thought of spending even longer clearing this software

crud off wasn't an appealing one. HP can put what it likes on here, as can Lenovo and Dell on its own kit, but I will keep on mentioning how it damages the user experience each time I see it, until they stop.

What you don't get for this price is a mouse, keyboard or monitor, but I'd generally assume that the TV might often be the replacement for that last item. HP does a Bluetooth mouse and keyboard that it includes with some models, and they can be bought for £50 as an accessory pack. However, I haven't heard great things about them, so I'd consider sourcing your own input devices.

Overall, this is well designed and featured machine that wouldn't look out of place in the lounge. It isn't super quick or remotely a gaming platform, but for general web work and video playback it's more than acceptable. It could also double as a small office machine, because it's almost silent in operation.

Shame HP couldn't resist the urge to tar-and-feather it with apps and links that its customers invariably won't want.

**mm Mark Pickavance**

**“ For general web work  
and video playback it's more  
than acceptable ”**



**A nifty media PC with  
crapware issues**



# Xenta Curved LED TV Wallmount

Mark recommends you measure twice and drill once with Xenta's new wallmount

## DETAILS

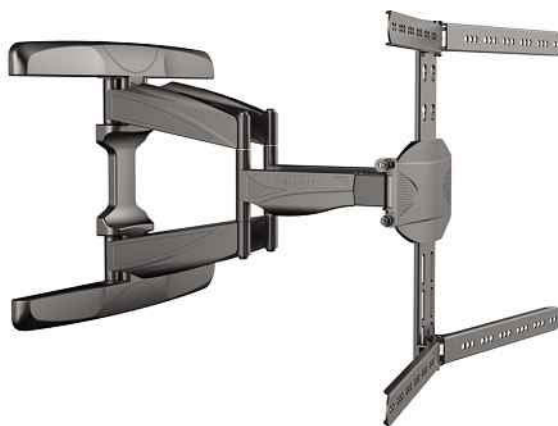
- Price: £49.98 (Ebuyer)
- Manufacturer: Xenta
- Website: [www.xenta.co.uk](http://www.xenta.co.uk)
- Requirements: Wall and TV or monitor

Since the advent of flat TVs and monitors, as a nation we've been trying to ween ourselves off all that badly made furniture that has graced British lounges for the placement of the goggle-box.

My advice, for what it's worth, is to dispense with the classic corner position, pick the biggest wall and orientate your seating accordingly. But to do this reorganisation justice, you'll need to wall mount the TV.

The Xenta Curved wallmount (PSW661CURV) is built specifically for this job and can handle screens from modest 32" sets up to monster 65" behemoths weighing anything up to 45kg.

As the six cantilevered support arms can extend an amazing 51.4cm from the wall, that's a huge turning force that it's designed to withstand. To achieve this structural strength, Xenta made it from exceptionally heavy gauge steel, so I recommend you find a strong friend to help you install it.



Other than the weight, deployment is relatively straightforward as long as you have a solid wall or you know how to find the woodwork in a soft one.

Looking not unlike a Tie Fighter when extended, the mounting splits into two parts, one of which goes on the wall, while the other is attached to the TV or monitor.

Placement of the wall element requires you to use six very large

screws, for which you'll need to drill some 1cm diameter holes in your solid wall or 5mm ones into the studs. All fixing are included, even the VESA ones for the display, and they even include a magnetic spirit level to help you get it all true.

Once this section is properly connected to the wall, Xenta includes some attractive fascia elements to hide your dubious handwork, thankfully.

The monitor part has adjustable arms and offsets to cope with a curved panel, but it will work equally well with a flat one. Once you have that mounted, you can bring the two parts together and then tighten a couple of bolts using a small box wrench that Xenta also put in the box.

As these things go, and I've done a few, this is a relatively

straightforward exercise and should be accomplishable by anyone who can put up a shelf that doesn't immediately fall back down or have items roll along it.

What I especially liked is that this design allows for lots of adjustment once in place, it makes it incredibly easy to access the back for re-cabling, and there's a cable management system built into it.

Unless you're especially gifted at inaccurate drilling or can't differentiate between brick and plasterboard, then this should result in a professional looking job that you can easily reuse should you get a bigger TV in a few years.

And as these things go, it's not at all expensive.

**mm Mark Pickavance**

**A wallmount that can handle the biggest TVs easily**

## Specifications

- Wall distance: Max: 514mm / Min: 74mm
- Tilt angle: -2 / 12 degrees
- Six arms for stable installation
- Angle free tilting
- Integrated cable management
- Full motion: tilt, swivel & pan functions
- Fits TV's with different curvature
- Dimensions: 725 x 463 x 81mm





# Devialet Silver Phantom

A futuristic speaker, with an exceptional price

## DETAILS

- Price: £1,690
- Manufacturer: Devialet
- Website: [goo.gl/RxAQ9Y](http://goo.gl/RxAQ9Y)
- Requirements: Bluetooth 4.0 device, Dialog accessory for multi-speaker setup.



▲ The sleek looks of the Silver Phantom hide some of the most explosive sounds we've ever heard

▲ Within the Phantom, some serious magic is at work

With more than 41 audio awards under its belt, the French company Devialet has finally released its much anticipated Phantom range of speakers.

The Silver Phantom, however, isn't your everyday speaker. Within its glass fibre-filled polycarbonate shell lies an 800MHz dual-core ARM Cortex-A9 MPCore processor, with 512MB of DDR3 memory and a single Cyclone-V system-on-chip sound processing engine.

You can connect to it via Bluetooth, optical or Ethernet using the company's Phantom accessory, the Dialog, which is a basically a gigabit switch (with wi-fi capabilities), with a quad-core 1GHz processor inside to allow the synchronisation of multiple Phantoms so they can work together. Unbelievably, you can have up to 24 of linked at once.

The technology used within the Silver Phantom is just as polished as its white and grey stylish exterior. For example, you get HBI (Heart Bass Implosion), ADH Intelligence (Analog Digital Hybrid), SAM (Speakers Active Matching) and ACE (Active Cospherical Engine). Most of these are patented by Devialet itself, with a long list totalling 88 individual patents all crammed into this single mono speaker. It

sounds like a lot to take on for just one unit, and in many ways you can be forgiven for ignoring most of the lengthy technological explanations. But the proof, as they say, is in the eating – or listening in this case.

The sound produced from the Silver Phantom is seriously good. Every frequency and every possible range is hit to near perfection. Even when you crank up the volume to a full ear-bleeding 3000W 105dB, there's virtually no distortion, although you'll likely be promptly removed from the neighbours' Christmas card lists.

This level of sound reproduction is thanks to those aforementioned patents and the four drivers, two of which are large subwoofers capable of moving a mass of more than 30kg. In fact, the entire resonance chamber within the Silver Phantom generates the equivalent air pressure of a rocket taking off.

One more addition to the technology side that we found interesting was the fact that there are no wires within the Silver Phantom; the Silver Phantom is made up of PCB modules that carry the necessary voltage through various resistors and DAC. This, the company claims, reduces lag and produces a more

stable power rate and constant temperature throughout, and Devialet calls this technology Magic Wire.

However, while it's easy to perforate our ear drums and wax lyrical over the exterior and interior designs, as well as drool over the technology, there are a few of flaws we think need addressing.

For a start, there's the ridiculous power cable that comes with the Silver Phantom. Here you have a futuristic pod-like speaker, and from the rear of it streams a built-in length of thick, yellow cable, the kind you'd normally see on a lawnmower. The cable terminates in a kettle-lead type end, which extends into a recessed area at the rear of the Silver Phantom.

Within this recessed area you'll also find the optical and Ethernet ports, arranged at the top of the cut-in section. They're incredibly awkward to get to and trail a cable from once the power section is plugged back in again.

The third problem we have is the cost. While this level of technology is impressive, it doesn't come cheap. In fact, the Silver Phantom we have on test here retails at £1,690. The lesser powered version, called simply Phantom, will set you back £1,390. Then there are the

accessories too, with the Dialog that we mentioned earlier costing £249 and a Phantom remote costing £129. That's probably the reason why so many owners are said to be pop stars.

The Silver Phantom is by far one of the best speakers we've ever reviewed. It's excessively loud, crystal clear, looks amazing and is equally eye-wateringly expensive. Despite the odd choice of port placement and the weird Black & Decker power cable, the Silver Phantom is every audiophile's dream. But those audiophiles may have to sell one or two organs before they're able to afford it. One positive point regarding the cost, though: Devialet offers free shipping with every Phantom.

**mm David Hayward**

**Absolutely incredible, but only serious audiophiles need apply**



# GROUP TEST

## Powerline Adapters

Powerline adapters (many of which can also be referred to as HomePlugs) have been in service in homes and businesses across the world for a good few years now. Since the early days, the technology has improved greatly, so they're not quite the flaky devices they once were.

We have six different models to test this week, to see which are worth considering when it comes to extending your home network.

### Powerline Adapters

## Edimax EW-7438RPn

#### DETAILS

- Price: ~£19
- Manufacturer: Edimax
- Website: [goo.gl/fA7kli](http://goo.gl/fA7kli)
- Requirements: Good wi-fi signal from the router, good electrical setup too

**P**owerline adapters have come a long way since they were first introduced some years ago. Back then, of course, they were pretty simple network extension affairs, but in the years since they've evolved into powerful home networking devices; some even incorporate a wireless element.

A prime example of one such wireless-enabled powerline adapter is this Edimax EW-7438RPn, a compact wall plug wi-fi extender that is capable of attaching to existing 802.11b/g/n networks. It features 2MB of NOR flash memory, along with 16MB of SDRAM, has a dual internal antennas that scan the 2.4 to 2.4835GHz frequency band and can offer a much improved speed boost when

the device you're using is at the outer reaches of the current wi-fi zone.

Furthermore the EW-7438RPn also includes a side-mounted Ethernet port, which will cater for the more traditional powerline setup to wired PCs and devices. There's a handy power switch at the bottom to save electricity and a WPS button on the front for easy setting up to a WPS-enabled router.

The front of the extender houses five small LEDs, indicating wireless signal strength, wi-fi connection, power, WPS activation and connectivity through the Ethernet port. They're a simple solution to determining any problems, by reading the number of times they remain solid or the rate at which they flash. You'll obviously need the quick setup sheet handy if you want to refer to their code in the future, though.

Setting up this device is pretty simple. One way to do it would be to plug it in, press the WPS button in conjunction with the one on your router, then let the hardware synchronise and pair itself. Or you could pair them up via Ethernet and use them in powerline mode.



▲ The Edimax EW-7438RPn takes the powerline adapter into wi-fi territory



▲ Finding the best placement might require some trial and error



Our tests had an Android tablet dropping the signal from the router close to the rear of this writer's house and transmitting speeds of just 8Mbps, but with the EW-7438RPn installed, we managed to increase the signal to 21Mbps. From there we were able to move several more metres before the signal began to fade once more. Overall, this extender managed to add an extra four metres worth of coverage beyond the ISP-supplied router.

Although the Edimax EW-7438RPn did a sterling job of connecting to and extending our wireless network, we did find that it took some time for it to actually connect after being powered up or after we rebooted the router. On average, the connection to the router's wireless signal took around 50 seconds, which might not sound long, but during that time the front LEDs were flashing as if to indicate a problem. However, it did eventually connect, and as long as we didn't power either device off, they worked perfectly well.

Correct placement of this adapter is essential to enjoy its benefits. When you have that, it's a solid, quick and cheap way to improve and extend your wireless signal, so it's worth experimenting. On the whole, though, a decent powerline/HomePlug extension device.



# Trendnet Powerline 1200 AV2 Kit

## DETAILS

- Price: £40
- Manufacturer: Trendnet
- Website: [goo.gl/FlezvD](http://goo.gl/FlezvD)
- Requirements: Good electrical setup, Windows XP or later for the software

**W**e recently looked at the Trendnet Powerline 1200 AV2 kit in its own review, and while good, seeing how it stacks up against the competition could perhaps be regarded as a more rigorous test.

The 1200 kit (TPL-421E2K) is the flagship of a new range of AV2 (AV2 MIMO), high-speed powerline adapters from Trendnet. This pair of adapters, complete with power pass-through sockets, come with gigabit Ethernet ports and sync buttons that change the encryption key and work as a reset. They boast data transfer speeds of up to 1.2Gbps, which translates to roughly 150MB/s.

In the box, you get the two powerline adapters, two generous 2m Ethernet cables,



▲ The adapters are large, so they could be difficult to fit into some sockets

an installation guide, a CD containing the digital version of the user manual and a utility called Power Pack to help you find the powerline adapters on your network.

actually get in real life. The advertised 1.2Gbps speeds of this adapter are a little exaggerated when used on the 'average' electrical layout. However, it's not all

**“ You'll almost certainly notice an improvement with these adapters ”**

As with most powerline adapters, the CD isn't necessary. All that's needed is for you to plug in both adapters and away you go. The adapters come pre-encrypted using a 128-bit AES algorithm. At worst, you'll need to press the Sync button on them to pair them up in the rare case of them not finding each other initially.

Transfer speeds between powerline adapters have always been a bone of contention, regarding the numbers written on the packaging and what you

bad news here. Our tests, conducted in one such 'average' house with mostly DIY electrical wiring, managed a reasonable 560Mbps, which worked out at around 65MB/s for transfers of files between computers.

When we moved the adapters to the furthest corners of the house, that speed did drop to 480Mbps, but that still equates to around 57MB/s. That's not too bad and is certainly enough to enjoy a streamed movie from a local NAS drive or a spot of

gaming, and it's more than enough to handle even the fastest broadband speeds currently available in the UK. What that means is that you'll almost certainly notice an improvement with these adapters if you buy them to replace an older standard powerline set.

The Trendnet Powerline 1200 AV2 Kit does a very good job compared to other powerline adapters available. However, we think the adapters themselves are a little too large, with 65mm of the adapter protruding down the wall once they're plugged in. Obviously if your plugs are quite close to the skirting board, you're not going to be able to plug these adapters in without carving out a section of the floor below.

But despite the sheer size of these plugs, they're certainly capable of delivering good speeds across your home network. Of course, this all depends on varying factors, such as the electrical wiring in your home and so on, but we think you'll appreciate the bandwidth they offer.



▲ The Trendnet Powerline 1200 AV2 kit is one of the fastest we've ever tested



## Powerline Adapters

### D-Link Powerline AV 500 HD Starter Kit

#### DETAILS

- Price: £20
- Manufacturer: D-Link
- Website: [goo.gl/JY0WwL](http://goo.gl/JY0WwL)
- Requirements: Good electrical setup, OS independent



▲ A slight change to the design for the D-Link AV 500 range of powerline adapters



▲ For some reason, this particular model crumbled under the pressure

**D**-Link has been knocking out powerline adapters for quite some time now, and its experience in the field shows. The price is reasonably competitive, the design is functional, and the technology is stable enough to work out of the box without too many problems.

The design of D-Link's powerline adapter kit hasn't changed much over the years. They're still glossy white units, with an attractive curve to their faces and three green LEDs at the front. However, there have been a few alterations to the ends, which add a few design enhancements to the traditional fare. Most notable is that the Ethernet socket has moved back to the bottom of the device, as opposed to one side of it – in our view, a good decision.

Looks aside, the test performance of the D-Link Powerline HD Starter Kit started off very well, and the streaming of our full HD media worked perfectly fine when just a single PC was browsing the internet.

However, when we started to access the NAS drive, browse the web and play a networked game, the connection dropped several times. Also, when attached to a PlayStation 3, there were severe buffering problems, file

or playing an online game, then it'll do a satisfactory job. However, if you're looking for a set of powerline adapters that can be used to extend your network to several PCs (such as connecting to a switch, for example), then you're probably better off looking at the previous Trendnet entry.

Other than the bandwidth problems we had when we asked several networking applications to work at once, this D-Link HD Starter Kit was easy to use and set up. We like the fact they're compact enough to accommodate virtually any plug location, not being too long or bulky. And there's a pretty efficient power saving mode built in, which fires back to life the moment a packet is detected.

The D-Link Powerline AV 500 HD Starter Kit costs in the region of £20, which makes it quite alluring, but if you're considering your first set of powerline adapters, we think you could do a lot better than what's on offer here. On the other hand, as we said earlier, if you simply want to extend the network to a machine that only requires basic web browsing, then £20 isn't too bad an investment. Be aware, though, that might well struggle later on should you decide to extend the role of the attached PC.

“ Watching HD media content was near to impossible ”

transfers were interrupted and watching HD media content was near to impossible due to the amount of stuttering and connection difficulties.

Clearly the AV 500 struggled when the amount

of network traffic was turned up, and we're not sure what it had against our aging PS3. Under normal circumstances, the D-Link Powerline AV 500 HD worked well enough, and provided you're just browsing





# Netgear Powerline 500

## DETAILS

- Price: £40
- Manufacturer: Netgear
- Website: [goo.gl/x6V46h](http://goo.gl/x6V46h)
- Requirements: Good electrical setup, Windows XP or later/Mac OS X for Netgear utility

**T**he Netgear Powerline 500 adapters have been around for quite some time now

and have altered in their appearance somewhat over the years. However, despite the design differences, the Netgear Powerline 500s are still a pair of nano-sized units that form the basic, albeit last generation, of Netgear's numerous powerline plugs.

The single 100Mbps Ethernet port is located at the bottom of the unit, and the one-touch security button is located on the left, with three LEDs on the face. The Powerline 500s measure a mere 70 x 51 x 25mm, which makes them only slightly bigger than standard power plugs.

The performance of these Netgear powerline adapters was excellent. The tests we put them through were completed without any problems or drops in connectivity. On a single PC, they worked very well indeed, and when we hooked them up separately to a smart TV and a PS3, they again performed without any problems. We even managed to get good overall bandwidth when we hooked them up to a switch and had a PC and a pair of laptops all streaming from a NAS drive.

Netgear supplies a disc with a basic powerline plug detector utility. The utility itself wasn't too bad, and once installed, it picked up



▼ The Netgear Powerline 500 adapters are really very good



“ You'd certainly be very pleased with the results if you purchased them ”

the Powerline 500s and gave us a graphical representation of their connection to the network. From here, you can rename the devices, turn off the LEDs on the front of the devices and play around with the security key. It was easy to use and easy to understand, free of technological language and unnecessary menus.

In terms of the green side of the Netgear Powerline 500 set, like their other powerline brothers, the units will power themselves down within 60 seconds should there be no network traffic detected, then spring back into life when the connection is active again. Also, it's worth mentioning that the packaging that the units come in are made from 80% recycled materials, so not only are you grabbing a well-designed set of powerline adapters, but you're also doing the environment a bit

of a favour too. Incidentally, the standby feature drops the power consumption down to less than 0.5 watts.

In real-world terms, these Netgear Powerline 500 will make a superb addition to your home network. They're wonderfully compact, work like a charm, require next to no effort to get up and running and are very reasonably priced.

True, they don't have the grunt of the Trendnet adapters tested this week (if they did, then there's every chance they would come out on top), but considering what you get in the box, you'd certainly be very pleased with the results if you purchased them. Remember, though, this particular model of powerline adapter is still very much last generation, and the more recent products from Netgear's range may well have the Trendnet pair beaten.



▲ With a gigabit Ethernet port, they'd be amazing



## Powerline Adapters

### ZyXEL PLA4201 V2

#### DETAILS

- Price: £26
- Manufacturer: ZyXEL
- Website: [goo.gl/MJ0UkA](http://goo.gl/MJ0UkA)
- Requirements: Good electrical setup, Windows XP or later/Mac OS X for support CD

We originally looked at the ZyXEL PLA4201 adapters some years ago and found them to be a very capable powerline adapters. Now, though, ZyXEL has issued a version 2 of the PLA4201, so it'll be interesting to see if they match up with the company's previous release.

In the box, you'll find the two powerline adapters, a couple of 1.5m Ethernet cables, the obligatory quick start guide and a DVD containing the documentation and a handy utility. The utility is a network configuration tool and offers all sorts of options to those who wish to fine-tune their powerline setup. From here you can view the network topology, update the firmware, create access passwords with data access keys and change the priority of traffic between the units. It's easy to use and offers more depth for experienced users too.

In terms of performance, we achieved speeds of up to 9.5MB/s when transferring a 5GB file from one PC to another. Similarly, the streaming of BBC HD media was unaffected, with no stuttering or buffering.

The streamed full HD content test was an area where we expected the PLA4201 to fail or, at the very least, struggle, but we were

▲ The newer version 2 of the ZyXEL PLA4201 is just as good as the last generation

▲ There's plenty of technology involved here and good network speeds too

“ These adapters come across as being hardy and well designed ”

pleasantly surprised to find that all our content played flawlessly. Indeed, the only slowdown we experienced was when we hooked the PLA4201s up to a switch and connected a mixture of four

PCs and laptops to test file transfers and streaming media. In this case, the transfer speeds dropped to less than 1MB/s, but that's hardly surprising.

ZyXEL was always conscientious regarding its

impact on the environment, and in the case of the PLA4201 v2, the green credentials of the hardware once again comes up trumps. The PLA4201 adapters will start powering down to just 0.5 watts of power consumption if there's no traffic for a set amount of time (60 seconds), reducing your energy waste in this instance by a staggering 88%.

Security comes in the form of 128-bit AES encryption, all via the one-touch button located on the side of the unit and through the admin software.

These adapters come across as being hardy and well designed. Despite the tiny dimensions of 50 x 25 x 70mm, the included technology and QoS media enhancements do an admirable job of keeping your network in tip-top condition.

The ZyXEL PLA4201s offers a fine choice for those looking for an excellent powerline product. In real-world conditions they work exceptionally well and are really stable networking devices. It would have been a better sell if the Ethernet ports were of the gigabit variety, since most ISP-supplied routers now have a gigabit switch, but for such a low price, you can't go far wrong with these.





# ZyXEL PLA5205 600Mbps Powerline adapter

## DETAILS

- Price: £35
- Manufacturer: ZyXEL
- Website: [goo.gl/TnSXlm](http://goo.gl/TnSXlm)
- Requirements: Good electrical setup, Windows XP or later/ Mac OS X for admin software

The ZyXEL PLA5205 set consists of a pair of 600Mbps powerline adapters, which

improve networking performance by more than 20% and offer an improved connectivity range, due to the transmission of data across all three electrical wires – neutral, live and earth – using a technology called SmartLink Plus.

ZyXEL's second entry here has some interesting features on hand, the nice big 600Mbps AV2 data rate being one. But also of note is the commitment to providing green technologies while still offering a decent product.

These powerline adapters are equipped with a gigabit Ethernet ports, enhanced quality of service designed specifically for media streaming (whereby HD video streaming is prioritised over normal traffic) and a power-saver function, so if there's no network traffic detected for 60 seconds the they'll drop to a power consumption rate of less than 0.5 watts. In addition, they also have one-touch security buttons that will protect your data transmissions with 128-bit AES encryption, which is further managed via the included software and the ZyXEL Powerline client – handy if security is as important to you as bandwidth.



▲ The ZyXEL PLA5205 is an impressive powerline adapter



▲ With a good mix of technology and network speeds, it's certainly worth buying

“ A good buy for those who want to stretch their home network ”

The admin software is a little complex for beginners, but the various menus and so on are reasonably well labelled, and there's little that can go wrong should you become a bit click happy when at the admin level.

Full HD media was streamed from a NAS unit

to a PC, PS3 and a selection of laptops, and they all performed perfectly, without any stuttering or noticeable drops in bandwidth. On top of that, file transfers were clocked at an impressive 40MB/s for a 5GB file, with only a slight drop when we decided to flood the entire

network with streaming HD media.

Obviously, every location or setup is different, so our results may differ to your own, but we found these adapters worked perfectly well when plugged into a power gang.

It's difficult to find fault with the PLA5205s. The only slight problem we came across was with the fact that the kit is larger than some of the other powerline adapters we've been testing, so it was a little difficult getting to the port when the actual plug socket was located lower down on a skirting board. Still, it's not as big as the Trendnet pair we looked at, but then it's not quite as fast either.

The ZyXEL PLA5205 600Mbps Powerline kit is a good buy for those who want to stretch their home network, while still having a higher rate of bandwidth. They may not be as fast as the Trendnet entry, but they cost around a fiver less. Plus there's the extra transmission technology included, which can help improve your signal considerably.





### ZyXEL PLA5205 600Mbps Powerline Adapter

Although they're not the fastest powerline adapters in the group, the ZyXEL PLA5205s use some excellent technology and are very stable networking devices.

They're also slightly cheaper than the next best kit.



### Trendnet Powerline 1200 AV2 Kit

Representing the latest in powerline technology, the Trendnet Powerline 1200 AV2 adapters come at a reasonably good price, but the one problem they have is the sheer size of the plugs themselves. If they were a little smaller, then they'd easily be this week's winner.

## How We Tested

Each powerline adapter was connected to an LG smart TV, a PlayStation 3, two PCs and three laptops of various makes. We ran the media streaming test from a NAS drive connected to the same network, running from a BT Home Hub 5, and copied 5GB files to and from each machine to ascertain a rough average data transfer speed. We also attached a switch to the powerline adapters to see if the speeds would be greatly affected by multiple connected machines.

We also tested in a house, complete with a questionable DIY electrician status.

	Edimax EW-7438RPn	Trendnet 1200 AV2 Kit	D-Link Powerline AV 500 HD	Netgear Powerline AV+500	ZyXEL PLA4201	ZyXEL PLA5205
<b>Price</b>	£19	£40	£40	£40	£26	£35
<b>Dimensions</b>	76 x 47 x 41mm	61 x 123 x 68mm	70 x 52 x 26mm	70 x 51 x 25mm	50 x 25 x 70mm	81 x 28 x 56mm
<b>AES Security</b>	128-bit one touch	128-bit AES	128-bit one touch	128-bit one touch	128-bit one touch	128-bit one touch
<b>Average Transfer Speeds (5GB)</b>	9MB/s	65MB/s	8MB/s	10MB/s	9.5MB/s	40MB/s
<b>Power Saving</b>	None	0.5 watts	0.5 watts	0.5 watts	0.5 watts	0.5 watts



# Your Letters

## iPhone Upgrade Stuffs Texting

It's very rare for me to feel the need to write to the press, least of all on IT, even though it is a subject dear to my heart. But I think this point is one which many of your readers will want to see aired.

I usually hold back on OS updates, but this week upgraded my iPhone. Now some bizarre grey box with 0.00 overlays every text I try to write,

Checking on the web this seems to be a major problem, the fixes are only temporary, with the problem reappearing almost immediately.

Interestingly, one of the Apple user message boards has effectively closed discussion on the topic, claiming the responses are not helpful enough. I thought the advice snippets offered were as helpful as people could be and much more helpful than Apple's silence.

There is a deeper point here. I have been in software development since the mid 1980s and have seen companies come and go. People often look back in hindsight at a specific moment when companies seem to have 'peaked'. From then on, they were never the same. Think Netscape, Borland, Compaq, DEC,

Myspace, even Microsoft with its paperclip.

This level of bug in the user interface would never have happened under Steve Jobs. His fortune was built on his profound understanding that he was building consumer goods for customers, rather than pushing things out of a demo lab. Those responsible would have been bobbing around San Francisco Bay by now.

As for me, I am switching to WhatsApp and considering a switch to Android next time.

Keep up the good work.

**Des Hickey**

## Windows 10 Versus Linux

I have dabbled with Linux over many years, but always returned to Windows, mainly because I offer support for friends and family who all run Windows. For the last year I've been running W10, and as it says on the tin; it is probably the best Windows so far, but I have just removed it from my main machine and replaced it with Linux Mint, and also assisted my partner in preventing her laptop from updating from W7 to W10.

So what have I got against W10? Microsoft seems to have forgotten that I purchased my PC. It is MINE; it is not theirs to do with as they want. If there is an upgrade to the OS, I want to be able to say whether I want it or not. Even worse, MS

assumes it can take up space on a laptop for an upgrade download without asking. It is MY PC not Microsoft's PC to play around with. It is MY Internet connection, and I will decide how I use it and what I download, not Microsoft.

Going back to my days as a systems analyst, I looked at what I want from a PC. I want to surf the web, send and receive e-mails, run office programs and play occasional games. I can do all this without W10. I could go back to W7 or XP, but these have or will lose support from MS and be susceptible to attacks, so the obvious answer is go with Linux, which is free and secure.

**Steve Ward**

## GET IN TOUCH...

### By email

[letters@micromart.co.uk](mailto:letters@micromart.co.uk)

### By post

Micro Mart  
30 Cleveland Street  
London  
W1T 4JD

### Online

[forum.micromart.co.uk](http://forum.micromart.co.uk)



# The Download Directory

**James Hunt** scours the internet for the best freeware, shareware and paid-for application releases

**T**his month, The Download Directory's collection of offbeat and largely unexplored applications includes Hybrid, a video-conversion application aimed at expert users; IObit Uninstaller, an uninstaller and program manager to help clear out your system; O&O ShutUp10, a privacy managing tool for Microsoft's latest operating system; and Immersive Explorer, a file managing program built to resemble the Windows Metro interface.

## **Hybrid 2015 10.21.1**

**Release Type: Freeware**

**Official Site: [www.selur.de](http://www.selur.de)**

Converting video files between different formats is easier than it's ever been, but that doesn't mean it's not still a confusing and unforgiving process that most video conversation applications do very little to help you figure out. That being the case, we had high hopes that Hybrid might be the program to get things out of that rut.

You can probably imagine how long those hopes lasted.

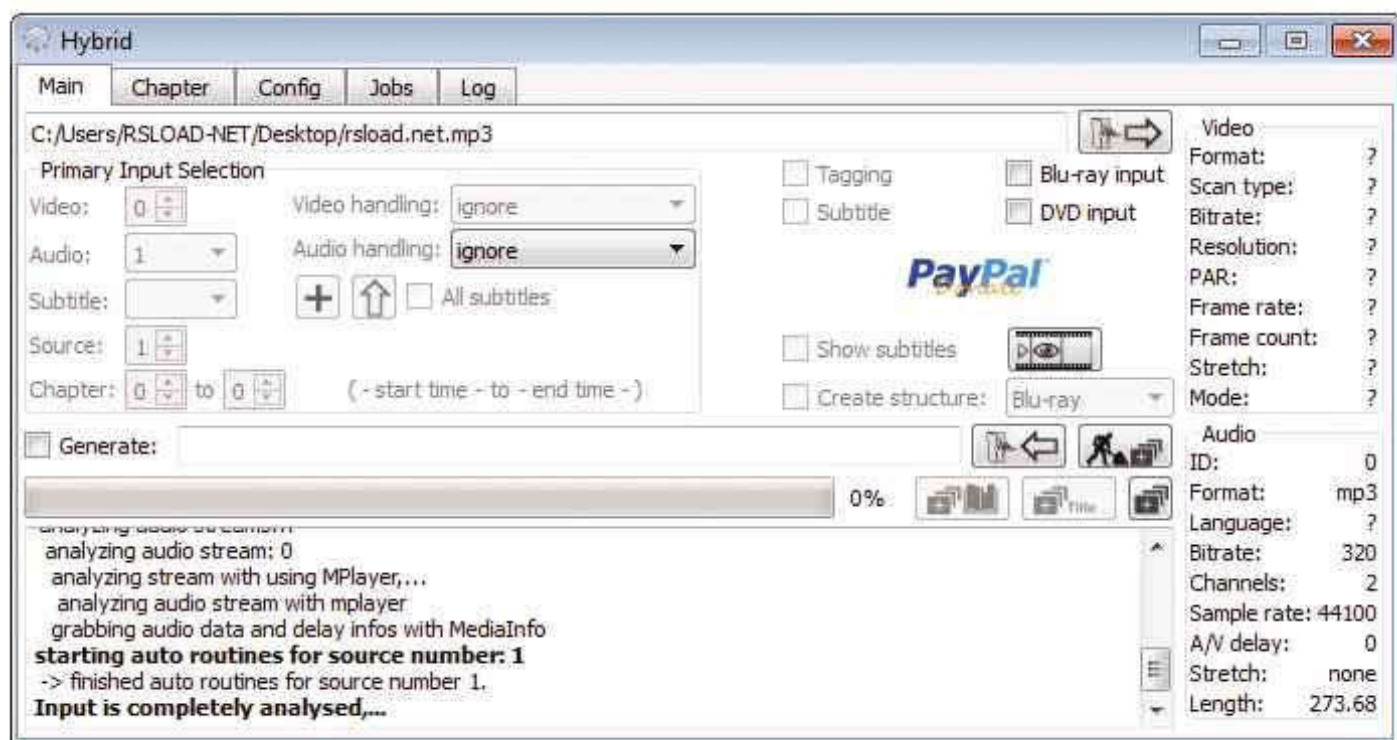
The first surprise Hybrid delivers is its file size. The 100MB download balloons to an absolutely colossal 700MB once

installed. Afterwards, it requires you to download even more to ensure that it has all the filters and codecs it needs to run properly, and if you don't do that, there's a chance it'll crash on loading, rendering the software completely useless anyway. Individually, any of those tasks would be a large hurdle to clear. Together, we're amazed the software can survive at all.

Once you get into the program, Hybrid is fairly standard stuff for this sort of application. Packed with options offering fine micro-control over the conversion process, it's clearly aimed at expert users, to the point where even those with some technical knowledge are going to struggle with it. You have to go all in on this one if you want to output to be at all well made.

On the plus side, it does have extremely wide support. You can feed in popular formats like MP4 and MKV, or more obscure ones like webm, and it'll spit out videos in the format of your choice. You can even instruct it to create Blu-ray and AVCHD disc structures, with subtitles and chapters intact, ready for immediate burning. There's no wizard, but the process is at least fairly well ordered, so you can methodically set each option to what you want – assuming you understand it, of course.





The program is, at least, in active development. The current version was released just days ago and improves Windows XP compatibility for the new software, which is quite encouraging in terms of its long-term prospects. It's not a program that's easy to get on with, but at the very least you can remain confident that the developer has their heart set on keeping it going. The text-heavy, data-heavy interface aside, it's good at what it does. But finding that out could be a lot easier than it is.

**Pros:** So many options you won't know where to start.

**Cons:** So many options, you really won't know where to start.

**Rating:** 3/5

### IObit Uninstaller 5.1.0.7

**Release Type:** Freeware

**Official Site:** [www.iobit.com/en/advanceduninstaller.php](http://www.iobit.com/en/advanceduninstaller.php)

Uninstaller applications tend to fall near one of two poles: either they're dangerous because they indiscriminately remove files and registry entries that are actually needed by your system, or they use such a light touch that there's almost no reason to use them. It's a balancing act that, thus far, has prevented them from becoming the must-have tool in anyone's arsenal.

But most of them are created by developers who seem more interested in cornering a market than providing high-quality software. IObit is a credible name with solid security credentials behind it. Can its attempt at creating an uninstall program shrug off the stigma associated with them?

To an extent, it can. IObit uninstaller is a multi-capable uninstall tool that completely eliminates registry entries and unused files that a proprietary uninstall program might leave behind. The process has two distinct stages: first you run the actual application uninstaller, then IObit's 'powerful scan' option checks your registry and hard drive to see what might have been left behind. You then choose whether or not to delete the stuff it finds.

But that's not all it does. There's also a 'Forced Uninstall' option, which can remove programs when the uninstaller has broken. It's hard to know whether this works without spending a while performing intricate tests, so while we can't vouch for its effectiveness, we can say that it does appear reasonably

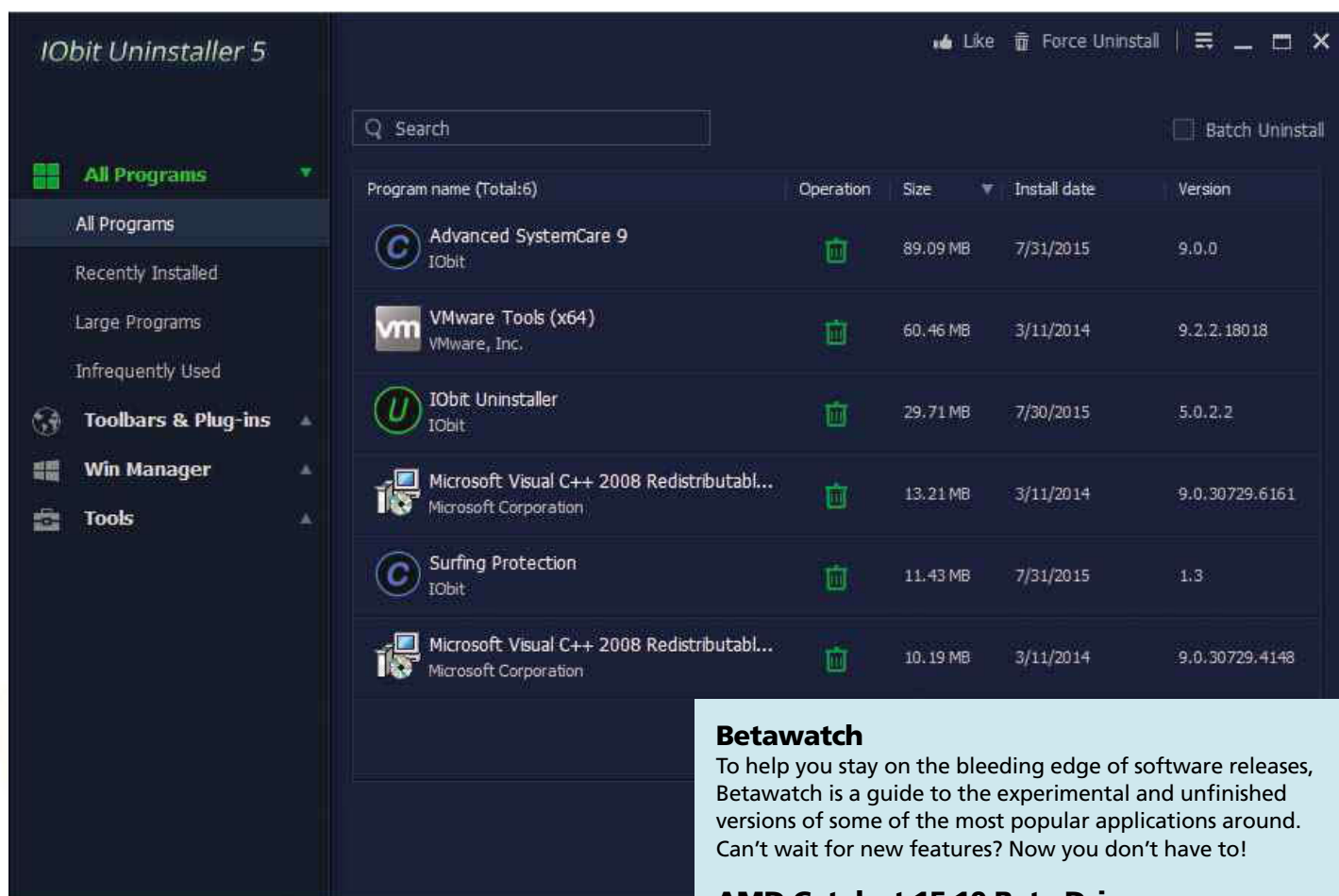
“ Once you get into the program, Hybrid is fairly standard stuff ”

effective. At the very least, it didn't seem to do any harm and got rid of the entry in the add/remove programs section, and maybe that's enough to call it a success.

Beyond even that, you'll find the ability to remove Windows components, manage programs that run on start-up, clean up temp files from uninstallations and even the ability to remove plug-ins for programs like Chrome. As part of its suite it includes secure file deletion, so when something's gone, you know it's really gone.

As well as its uninstall features, the program also doubles as a manager for your installed applications and components. It works quicker than Windows' built-in control panel tools and gives you more filtering options, so we can certainly imagine people finding that aspect useful even if the uninstall features don't win them over.

The latest version adds a number of new features, including the Windows Manager Module, which gives you control over start-up items, running processes and Windows update installations. The toolbar and plug-in removal that has just been added makes it a worthy security tool instead of just something the compulsively organised might want. It's not perfect by any



stretch, but if you're looking to clean your system up, it is, if nothing else, operating on a far more professional and reliable level than most uninstall programs can manage. That's enough for us to stick with it for now.

**Pros: Good at what it does. Possibly even the best.**

**Cons: Some features out of place in a program of this type.**

**Rating: 4/5**

## O&O ShutUp10 1.1.1348

**Release Type: Freeware**

**Official Site: [www.oo-software.com/en/shutup10](http://www.oo-software.com/en/shutup10)**

O&O makes a number of respectable tools, so when it comes to providing quality software you know it's on your side. That's what makes its Windows 10 anti-spy tool quite interesting, because while lots of quickly hacked-together programs to turn off Windows 10's internal reporting and logging seem like the work of overly cautious privacy fans, when actual companies with reputations to lose get involved, you can't help wondering if it might be worth taking seriously.

As the O&O site explains, Windows 10 passes a lot more data on to Microsoft than most users realise. It can access your calendar, your emails, your location and internet connection without asking, in the hope that it can give you a smoother and more practical experience. So far, so benign. But it can also share your wireless network login details with your Facebook contacts or connect your system to an unsecured wireless network without asking.

You may be fine with all this, but many people won't know it's happening at all. What ShutUp10 does is give you the

## Betawatch

To help you stay on the bleeding edge of software releases, Betawatch is a guide to the experimental and unfinished versions of some of the most popular applications around. Can't wait for new features? Now you don't have to!

## AMD Catalyst 15.10 Beta Drivers

**[support.amd.com/en-us/kb-articles/Pages/latest-catalyst-windows-beta.aspx](http://support.amd.com/en-us/kb-articles/Pages/latest-catalyst-windows-beta.aspx)**

The latest update to AMD's graphics drivers have just been released, and as usual if you're experiencing any problems with your graphics performance, now's the time to try this out. The drivers are available for all Windows platforms from Windows 7 SP1 onwards, in both 32-bit and 64-bit incarnations.

Changes in this iteration of the drivers include performance optimisations for *Ashes of the Singularity* and *Star Wars: Battlefront*, a fix to MPEG2 playback and Unreal Engine 4 crashes, a fix for 3D display problems experienced using Cyberlink PowerDVD and problems with YouTube's 4K playback.

However, while it's in beta there are some things to be aware of. If you expect to be affected by any of these problems, hold off on downloading the drivers until their full release!

Bugs in the current version include a crash in *Ashes of the Singularity* on 300-series GPUs and those with 2GB of video memory, clock core fluctuations when using FreeSync on CrossFire configurations, poor performance in *Elite: Dangerous* when using supercruise mode and an unexpected black screen (that does go away!) when booting Windows 10.

Those are some fairly major problems with the potential to affect quite a lot of systems, so for a change we'd recommend waiting for the stable release of these drivers unless you're directly inconvenienced by any of the things this update is designed to fix.



opportunity to easily and quickly decide for yourself which of these behaviours you're happy for it to continue with, with no need to go hunting into the depths of Windows 10's registry or settings pages.

The interface is simple to understand and can be easily navigated by users of any ability. A switch allows you to turn certain functions on or off, and shorter explanations of the feature you're addressing are complemented by longer, expandable descriptions that you can read if you're unsure. The software also includes recommendations as to whether a feature is worth activating or not, and you can choose them option by option or use profiles to instantly switch options on and off in bulk.

One slight irritation is that it prompts you to create a system restore point before every change, which could get frustrating if you're changing a lot of them at once. System restore points aren't a trivial thing, so it would be nice if the program only asked to do this before it enacted your changes in bulk, rather than every time you click on anything.

But despite this, there's not a lot to get upset about. The program itself is fully portable, so you don't need to install it to use it – just run it out of whatever directory it was downloaded into. Unlike other Windows 10 programs, it doesn't secretly download or install any other components or update itself without asking, so at the very least they're practising what they preach. We'd give it a go, even if you ultimately decide that you're happy with the stuff Windows 10 does without telling you, because it's right that you should, at the very least, know what that is.

**Pros: Simple and straightforward. Careful to explain itself.**

**Cons: System restore messages can get a bit tiring.**

**Rating: 5/5**

## ReDownloaded

This month, in our regular retrospective section, we're looking back at the November 2013 instalment of Download Directory to see how the programs we reviewed have fared. Are they better? Worse? Gone completely? Here, we find out.

### dupeGuru

[www.hardcoded.net/dupeguru](http://www.hardcoded.net/dupeguru)

**Reviewed Version: 3.8.0, Current Version: 3.8.0**

One of many similar applications designed to help locate and eliminate duplicates in file libraries, dupeGuru was relatively powerful compared to similar applications but still lacking in some more powerful features. Unfortunately, development hasn't moved at all since we looked at it, and the fact that it's described as 'dupeGuru for Windows XP' is probably a solid indicator that it won't be doing so in future.

### ShareX

[getsharex.com](http://getsharex.com)

**Reviewed Version: 8.4.1, Current Version: 10.3.0**

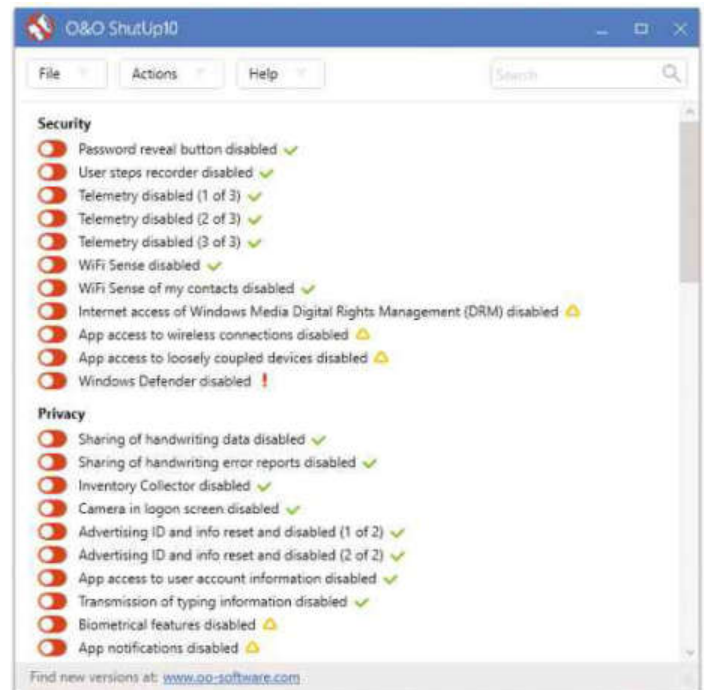
This feature-rich screen and image-capture program earned a full five-star rating when we first looked at it, thanks to its simple interface and huge number of options: you can automatically crop, rotate, resize, annotate, obfuscate, watermark and otherwise manipulate any screenshot you take. Development has since continued unabated, and the most recent update was released within the last month. It's

## Immersive Explorer 1.3.1

**Release Type: Freeware**

**Official Site: [www.julien-manici.com](http://www.julien-manici.com)**

Although Windows has definitely switched over to a tablet-friendly interface when it comes to launching and organising programs, Microsoft left its file explorer using the old-style interface. If you're a fan of the tile-based interface previously known as Metro (and there must be some of you out there),



still free, still excellent, and it has more features than ever before. Highly recommended, even two years after we first looked at it.

## SSD Tweaker

[www.elpamsoft.com](http://www.elpamsoft.com)

**Reviewed Version: 3.0.8, Current Version: 3.6.0**

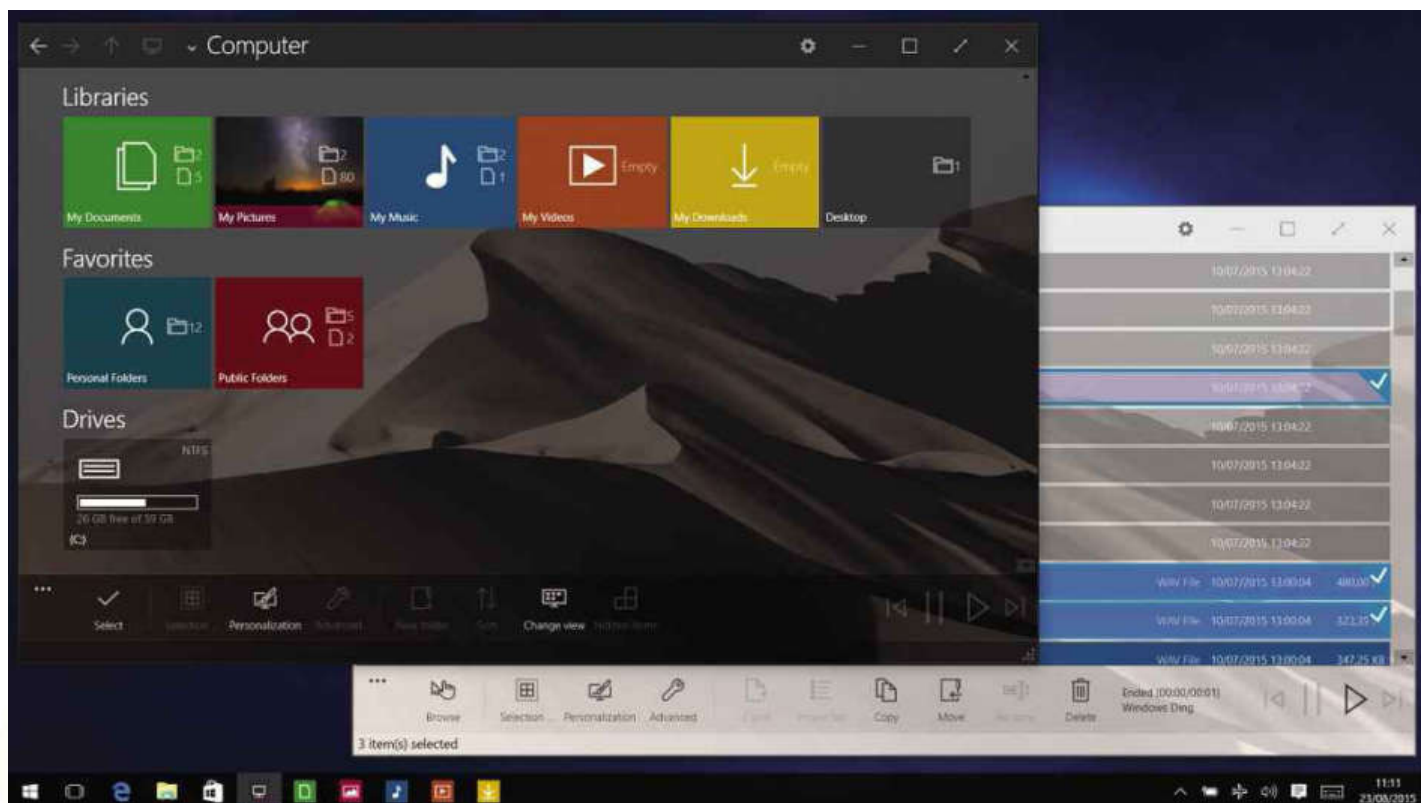
When we first looked at SSD Tweaker, SSDs were still relatively high-end pieces of hardware. Two years on, they're a virtual necessity in even standard systems, so SSD Tweaker should, in theory, have a bigger audience than ever. Unfortunately, the free version remains so stripped down as to be effectively pointless. You can pay for the diagnostic-heavy pro version, which is still just \$13, but the Free edition optimisations remain suspect at best. Best avoided.

## AlwaysMouseWheel

[www.softwareok.com](http://www.softwareok.com)

**Reviewed Version: 3.24, Current Version: 3.56**

This windows behavioural tweaker made it so the focus of Windows always followed the mouse, but in a slightly more powerful way than Windows did. Of course, this option is largely available in the latest versions of Windows, which leaves AlwaysMouseWheel without much to do. It's still in active development (the latest version came out in August) and is presumably aimed at older versions of Windows. So it's nice that it's still around, but we suspect its time has rather come and gone.



then Immersive Explorer gives you the opportunity to experience it when browsing and organising files too.

There's no denying that it looks the part, and it certainly has some decent features. The reason it's called 'immersive' is because you can do almost everything from within the program without launching an extra application. Want to view a picture,

“ Even though it's based on the look of Windows 8, Immersive Explorer is compatible with every Windows version from Vista to 10 ”

watch a video or listen to audio? Just tap it. Immersive Explorer lets you see the contents and manipulate them to a small extent without having to wait for another program to launch.

Although it's not technically a Metro-based application (so your custom settings and tile preferences may not be reflected within it), it is a very good impression of it. Of course, it's optimised for tablets and touchscreens, so anyone using it on a desktop system might find it lacking in the kind of quick access and organisation they want, but that's because it's not designed to compete with the speed of a mouse and keyboard. Instead, it's supposed to make a touch interface work for exploring files.

One slight problem is that despite being tablet-based, Immersive Explorer doesn't work with Windows RT devices.

There aren't a lot around, we admit, but it seems like a fairly major oversight. Still, if you're running a Surface RT, then you're probably used to being left behind by companies unwilling to support you, so it's pretty much business as usual there.

Even though it's based on the look of Windows 8, Immersive Explorer is compatible with every Windows version from Vista to 10, at least on desktop systems. Requirements are stricter on tablets: you have to be running an Intel Atom CPU from the Bay Trail line or newer to get a smooth experience, and at least 1GB of RAM is required.

There's a lot about the program that works, but the biggest problem with it is probably down to the actual premise. The Metro-style interface just isn't fun to work with. It's no surprise that this was developed before Windows 10 scaled back the prominence of its live tiles and metro home screen, and while the developer clearly believes in it, we're left a little suspicious of whether anyone else wants it.

But hey – if you like the idea, at least it's available for you to try it out, and the quality of the program is unassailable, even if the DNA of it isn't.

**Pros: Looks good. Offers a genuine alternative to Explorer.**

**Cons: It just happens to be based on history's most maligned interface.**

**Rating: 4/5**

So there you have it! Not a bad crop this month, even if everything we looked at wasn't brilliant. Remember, if you have any programs that you'd like to see us look at – whether it's something you want to find, something you like and want to share, or even a program you've written and want us to review – don't hang around. Get in touch, and we'll make sure it ends up in the download directories everywhere – courtesy of The Download Directory! [mm](#)



# Remembering...

## Nintendo Game & Watch

**David Hayward recalls why his thumbs now hurt when the weather gets a little cold**

Prior to having elaborate handheld consoles or even the smartest of smartphones and tablets, kids of the early 80s, because they were hip, could instead be seen strutting their stuff with a Game & Watch in hand.

The Game & Watch was an incredible device, one we look back at with great fondness. The tiny LCD screen, the directional D-pad arrangement, the Game A, Game B and action buttons too. There were also other buttons, depending on the model, such as the time button and those annoying pin-hole like buttons to set the alarm and alter the time. Considering its size and age, it was quite an intricate little device.

Of course, it was nothing much more than a toy, compared to the handheld phones, tablets and consoles we have today, but back then, there was still a certain innocence about the whole electronics industry – at least from the point of view of a seven-year-old-child.

### Its History

The Game & Watch was invented and developed by Nintendo technician Gunpei Yokoi, towards the end of the 70s, when the company decided to wind down its card games in favour of electronics.

The company needed something to help turn in a profit for it, and thanks to a combination of timing (with LCD screens suddenly becoming cheap enough to use), an amazing skill base with its engineers, and Yokoi himself, the Nintendo Game & Watch was born.

Rumour has it that Yokoi came up with the idea while on the train to work one day. He saw an extremely bored-looking, young Japanese businessman toying with his calculator in an effort to make it do something other than display numbers. With this in mind, Yokoi sat in his lab that day and started to jot down some initial concepts, which finally became the Game & Watch.

The first Nintendo Game & Watch was Ball, which appeared in April 1980. These Silver series Game & Watch models lasted well until the entire line died off in favour of the Game Boy, sometime in 1991. What followed were the Gold, Multi-Screen, Widescreen, Grandstand, Sunwing Wide Screen and Mini-Arcade models, all of which offering a slight advantage over or addition to the other models. There was even a model that came out in the mid to late 80s called the Radio Game & Watch, complete with a pair of dials to one side to tune into a local station – the game was Barrier, if anyone can remember it.

Sadly, as we said, the Game & Watch made way for the more dedicated and advanced Game Boy handheld console, which eventually turned into the Nintendo DS. So to all those kids now playing with their 3DS consoles, your handheld has quite the history behind it.

### The Good

Gaming on the go, two-player tournaments in the playground, and it could wake you up with its little 'beep beep, beep beep' alarm in the morning.

### Did You Know?

- The Game A and Game B buttons usually made the game go faster, for a harder level. But on some games it initiated a two-player mode or even changed the game completely.
- You can play a range of Game & Watch models online, at Pica-Pic.com.
- The D-Pad was specifically invented for the Game & Watch.
- Yokoi also invented the Game Boy and a robot arm to help him work when he was on the assembly line in his early days at Nintendo.
- There was a Vs. series that allowed you to attach a wired D-pad and buttons, for two players.

### Bad

Getting caught with one in class when you should be working, the alarm going off during a lesson, and those annoying pin-hole alarm and clock reset buttons – which always ended up being filled with lead from your pencil.

### Conclusion

The Nintendo Game & Watch was a fantastic gadget and quite possibly one of the first 'smart' handheld multi-function products ever. We salute you, Nintendo and Gunpei Yokoi.



▲ The classic Donkey Kong multi-screen Game & Watch



▲ The first ever Nintendo Game & Watch, Ball



▲ Some of them were exceedingly tricky to master and get top scores with

# RETRO ROUND-UP

**Dave E checks out two puzzle games, a malfunctioning spacecraft and a planet of death. Then he goes back to work in an office and ends up a slave to the undead. All in a day's work for the Retro Round-up...**

**T**his month in Retro Round-up, it's all about the games, and by this I mean it's all about new games. I have always been aware the Spectrum was the most popular machine of the 80s, but since writing this column, I must confess to have been amazed at just how popular it remains. Spectrum owners have it as good as PS4 and Xbox One owners when it comes to new releases. Did you know that there have been over 200 new Spectrum games this year alone so far? That's an average of two per week and reason the Speccy still tends to dominate this column.

In a nod to the retro magazines of old, I'm writing the whole of this month's article in the style of the 'Software Review' pages from these magazines, and dishing out points out of ten for Graphics, Sound, Presentation, Value for Money (if the game is not free) and Overall. No 'soapbox' or musing on the retro scene this issue, apart from a quick warning that, as reported previously, the central repository for Spectrum games ([www.worldofspectrum.org](http://www.worldofspectrum.org)) hasn't had such a great year, so you'll find a lot of brand new stuff isn't listed there yet. Hence you'll find a few links to a Google site which, for the time being, is simply chronicling the new stuff that hasn't made it to World of Spectrum just yet.

Other than that, however, there's no time to lose as we dive into each of these lovely new games...

## Pixel Quest

**(Spectrum 48K/128K, Einar Saukas, free, [youtu.be/qXKqWdLG\\_XA](https://youtu.be/qXKqWdLG_XA))**

I'd heard nothing about *Pixel Quest* before I loaded it up. The instructions boasted of its addictiveness and stated "solve each puzzle to gradually reveal heroes and other famous pixel images from your favourite Speccy games, against an amazing soundtrack by top composer MmcM."

Now, from about two seconds into this game, I was hooked. This might have something to do with the fact that I spent my pre-teenage years designing sprites on graph paper and then inputting them into my Spectrum. *Pixel Quest* turns that rather tedious procedure into a challenge in its own right. I even kidded myself that, being familiar with the 8x8 CHR\$ matrices of yesteryear might make me a natural at solving its puzzles. However, that wasn't the only hook factor. That music is every bit as 'amazing' as the inlay describes, and from the moment the title screen appears, the collection of loud, raucous and bouncy pop tunes are almost works of art in their own right.

It's actually hard to convey the idea of *Pixel Quest* in text and, from screenshots,

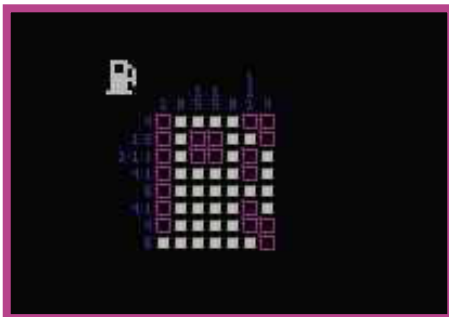
it will look like nothing more than a bland, computerised version of cross-stitch. If you've ever played the Japanese puzzles known as nonograms (as well as many other names), then you'll know what this game is about. Basically, you're given an empty grid. Let's imagine it's 12 pixels by 12 pixels (earlier ones are much smaller). Across the top of each column, and to the left of each row sits a combination of numbers. For example, if a row's combination reads 12, that means every pixel in that row should be turned on, hence 111111111111. Do that and the number 12 will dim, indicating that the row is set correctly.

That's easy, but if a row's combination reads 3-1-1-3, what's required is more ambiguous. Squares within the grid must be flipped to 11101010111. The problem with such a combination, however, is that you have 12 pixels to fill, so either 011101010111 or 111010101110 will be 'accepted'. Glance up at the columns above, where you have similar combinations to adhere to, and you may be able to deduce which one is correct. Alternatively, choose one for the time being and then shuffle it to the other if need be.

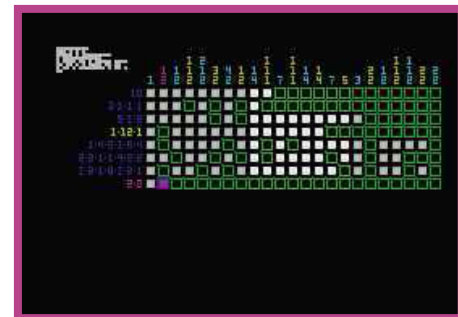
Lo and behold, as you begin setting the rows and columns to the combinations required, a sprite will begin to emerge. The



▲ A functional menu screen starts *Pixel Quest*



▲ Okay, this one's dead easy

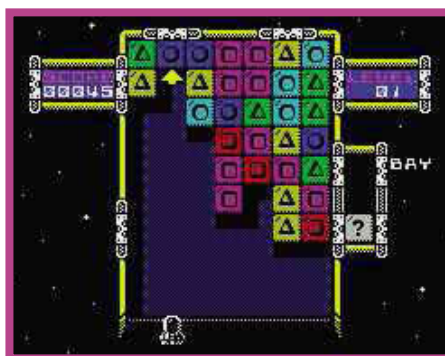


▲ Is it a bird? Is it a plane? Search me!

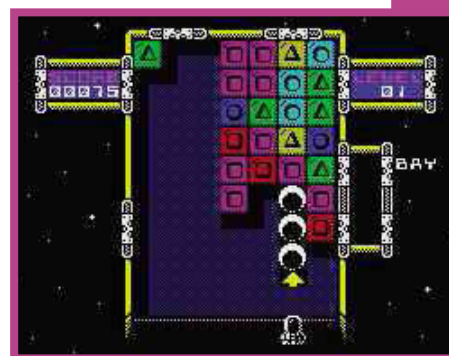




▲ In space no one can hear you scream



▲ This is a 'wildcard' block, which will match any colour...



▲ ...so placing it on top of two yellow blocks erases all three

objective is to have each row and every column combination 'accepted', meaning the sprite is correct.

Now if that all sounds Greek to you, then I'd recommend you visit [youtu.be/qXKqWdLG\\_XA](https://youtu.be/qXKqWdLG_XA) for a more illuminating demonstration.

The only small gripe I had with *Pixel Quest* was that, while you can move a cursor to plot each pixel, you can't 'shift' left, right, up or down the entire row/column. This meant that a few times I found myself having to tediously move along rows turning one bit off and the next bit on. Also, although the sprites come from 'famous' Spectrum games, I didn't recognise a single one of them!

*Pixel Quest* is a class act in all respects: engaging, puzzling, frustrating and mesmerising. While the game itself is taxing in its own right, anyone who's ever designed sprites for the 8-bit machines will also love the warm feeling of nostalgia that accompanies each game. The phenomenal soundtrack, admittedly a curious ingredient for a puzzle game, lifts this game head and shoulders over other puzzlers on the Spectrum. Make sure therefore that you're playing on a 128K Spectrum so you get the full experience; the 48K version doesn't have the music.

Available free from [sites.google.com/site/specy21/home](https://sites.google.com/site/specy21/home) (search for 'Pixel Quest').

### The Return Of Traxtor (Spectrum 48K/128K, Juan J Martinez, free, [youtu.be/HXtoJYyInGI](https://youtu.be/HXtoJYyInGI))

Another new puzzle game to play on the Spectrum is *The Return Of Traxtor*, in which you must stop – at all costs! – the columns of coloured blocks that begin at the top of the screen from reaching the bottom of it. You can destroy blocks from any column if you align three blocks of the same colour

(either vertically or horizontally), and you can grab the blocks themselves off the top of any column.

The skill of the game is in using the 'stack', which is a 'First In Last Out stack', familiar to software developers everywhere. You can, for example, pull a blue block from column 1, and a red block from column 2, but your next placement move would then have to affect the red block on the top of your stack. Your stack has space for three blocks, so you should find that you quickly develop the necessary skills to grab blocks, temporarily place them on other columns to place/destroy others, and/or grab them back again if need be. The speed at which the entirety of the wall of blocks descends increases steadily until a block inevitably crosses a line at the bottom of the screen and signals game over.

Although it's not going to set the world on fire, *Traxtor* does have a nice feel to it, nice sound effects and a bouncy tune on the title page. The game itself is pretty addictive too. The only real problem is that occasionally it doesn't seem as responsive as it should be.

Available free from [sites.google.com/site/specy21/home](https://sites.google.com/site/specy21/home) (search for 'The Return Of Traxtor').

### Cray 5 (Spectrum 128K, Monument Microgames, £8, [youtu.be/DtCRtimk9fY](https://youtu.be/DtCRtimk9fY))

Monument Microgames' latest Spectrum release is *Cray 5*, a graphic adventure set on a spacecraft. *Cray 5* is the name of the supercomputer that controls the spacecraft and, as you can probably gather, it has malfunctioned, meaning it's down to you to patrol the corridors of the spacecraft. The game is flick-screen and gives you control of a large spaceman sprite, equipped with jetpack. Your mission is to

### Scores (Pixel Quest)

**Graphics 5**  
**Sound 10**  
**Presentation 10**  
**Overall 9**

### Scores (The Return Of Traxtor)

**Graphics 5**  
**Sound 5**  
**Presentation 10**  
**Overall 7**

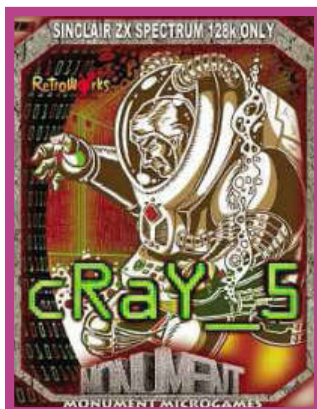
### Scores (Cray 5)

**Graphics 7**  
**Sound 7**  
**Playability 4**  
**Overall 7**

visit each level of the spacecraft and flip all the switches that control *Cray 5* to the 'off' position. There are patrolling service droids scattered around that drain your energy if you come into contact with them.

As with Monument's other releases, £8 buys you a spiffing product: you get *Cray 5* on tape, on a mini-CD, and you get a glossy instruction book and inlay, all amazingly designed and packaged. It's rather a shame therefore that, despite excellent sound and graphics, the game is quite a dull affair.

You begin by gliding around and exploring a few screens. You then realise further exploration requires a door to be unlocked, so back across the screens you



▲ *Cray 5* – with added extra amazing cover art from Monument Microgames



▲ Two of the hundred-or-so doors that lie in wait...



▲ It's gonna be a long night!

go to collect the key of the colour that matches it. Through it, you reach another screen, where the situation repeats itself (way blocked by a door, go find the key to open it, etc.). Unlike in the 'classic' graphic adventures of old (e.g. *Citadel*), there's no variety to the puzzles. On top of that, the patrolling service droids are difficult to shoot and/or avoid, particularly the ones that glide horizontally back and forth in some of the narrow tunnels you must ascend and descend. If you leave a room and come back to it, all enemies are also reincarnated. It's extremely tedious.

Not, however, that this has stopped *Cray 5* flying off Monument's shelves. Such is Monument's reputation for quality, initial stocks of the game were sold out within 48 hours of its release! A second batch is in the offing, though. Check out [www.facebook.com/MonumentMicrogames](http://www.facebook.com/MonumentMicrogames) for further details. Or alternatively, *Cray 5* is available as a free download from [www.worldofspectrum.org/infoseekid.cgi?id=0026115](http://www.worldofspectrum.org/infoseekid.cgi?id=0026115).

### Red Planet (Spectrum 48K, Salva Kantero, free, [youtu.be/7a650iYtX1g](http://youtu.be/7a650iYtX1g))

*Red Planet* is a graphic adventure and is written with The Mojon Twins La Churrera utility. In previous articles I have waxed lyrical about how annoying I have found games written with this (*Zombie Calavera* and *LaLa Prologue*, for example), because jumping is such a hit-and-miss affair, and because colliding with a bad guy ended with the hero being randomly thrown about the screen. In *Red Planet*, I still hate the jump control, but collisions result in the much more sensible loss of a life.

The story is the pretty typical 'explore the rooms of the planet, collect the explosives and return to the first screen with it all to light the dynamite' affair. And to be brutally honest, the game itself is also fairly typical: avoid the patrolling nasties, jump from platform to platform, make a map, find the keys and open the doors.

However, what I really like about *Red Planet* is the amount of strategy that

needs to be employed to play it correctly. You can run, jump and, once you've picked up a gun, shoot. But you can't just therefore pick a fight with any tentacled nasty bouncing about in front of you. This is because most of them should be avoided rather than vaporised; acting like Rambo will quickly deplete your ammo and make it completely impossible for you to get past various nasties. Likewise, keys and doors require their own strategy. Jumping is, as I've indicated, a strategy all of its own.

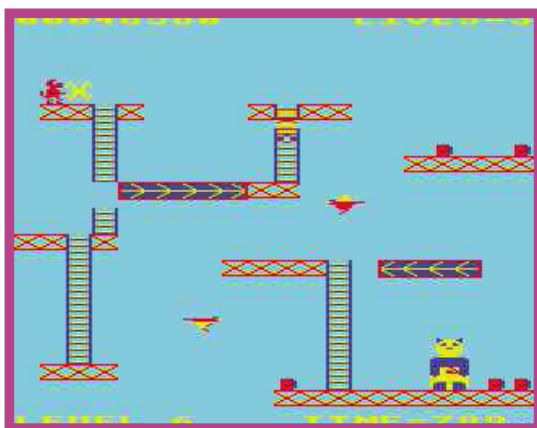
With only seven lives, *Red Planet* might be a little too tough for the beginner, but I found it very playable. You can download it from [sites.google.com/site/speccy21/home](http://sites.google.com/site/speccy21/home) (search for 'Red Planet').

### Hard Hat Harry (BBC/Electron, Retro Software, free, [youtu.be/uhHzzulh3uw](http://youtu.be/uhHzzulh3uw))

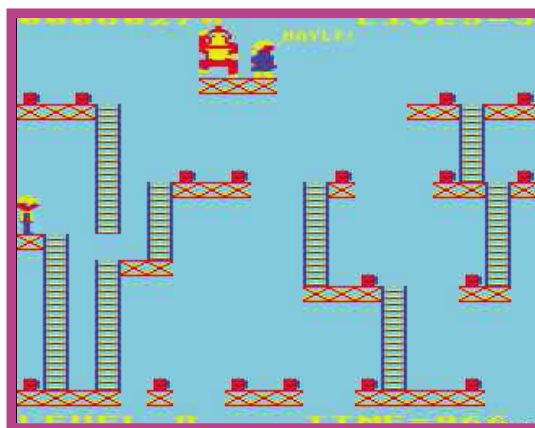
Who'd be the work experience boy? If you're not having to supply the mugs of tea and coffee to all those with 'proper jobs',



▲ The Retro Software cover art purposefully looks like something from 1982

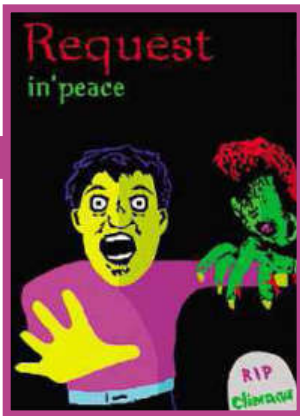


▲ The garish colours don't do the game many favours



▲ One of your co-workers seems to have made a new friend!





▲ The box art for *Request In Peace*, supplied by [Matranet.net](http://Matranet.net)



▲ The countdown timer is more terrifying than any zombie



▲ Why the undead wants a parchment is anyone's guess!

then you're having to shin up ladders, leap across gaping chasms and avoid the entire population of the nearby zoo!

*Hard Hat Harry* is a very responsive ladders and levels game for the BBC and Acorn Electron, originally released in 2009 but currently enjoying a renaissance thanks to the imminent release of *Hard Hat Harry 2: Son Of Harry*. The aim is to collect all the mugs on each of the platforms, and no matter how far you fall, you can't be hurt. It has something of the feel of *Chuckie Egg* about it, but it has a variable jump (the longer you hold down the jump key, the further you jump), more variety in aliens (gorillas, pandas, monkeys, etc.) and 16 screens to clear.

The colours chosen are odd. Bright cyan for the background and deadly flying spanners in yellow in the foreground?!

*Hard Hat Harry* was written by Tom Walker, whose name you might recognise as the main author of the celebrated *Repton: The Lost Realms*. Unlike *Repton*, however, he wrote it in just a couple of weeks rather than over five years. Were it not for his admission of this, though, I don't think anyone would be able to tell.

Available free from [www.retrosoftware.co.uk](http://www.retrosoftware.co.uk).

## Request In Peace (Spectrum 128K, Matranet, £8, [youtu.be/RPGtEZN1jzo](http://youtu.be/RPGtEZN1jzo))

Matranet ([www.matranet.net](http://www.matranet.net)) is a French publisher for the Spectrum, and *Request In Peace* is a 128K-only number. It costs about £8 and comes in a nice plastic box with inlay, insert and cassette.

There's a lovely textual prologue to set the scene of this highly original game, and it features a Cockney geezer who tries his hand at grave-robbing, only to end up the slave of a bunch of undead zombies.

Each of these zombies respectfully requests our hero to bring a certain object to one of the graves in the cemetery. Handily, most of these objects are easily accessible in the crypt at the top of the screen. However, the graveyard is home to some slightly more active zombies too, who wander around both getting in your way and, on collision, throwing you around and swapping your game controls.

Theoretically, all you're required to do is to touch the grave where the zombie has his hand up, grab the item he wants and push it into his outstretched claw. You're also not restricted to doing things linearly either; you can touch all the graves with the outstretched hands to save a little time if need be.

For the first few screens, you find you have just about enough time to satisfy all entombed zombies before time runs out. However, from screen four onwards, things start to get much more difficult. Items in the crypt become sealed up, meaning you now need to play tag between the zombie, a magic wand and the seal before you can even get hold of the desired request. When you fail to deliver – as you surely will sooner or later! – the zombie emerges from his grave as a demon. You can then charge at him holding the magic wand or see what he does next!

The gameplay and music is excellent, with themes from the movies *Candyman*, *The Forsaken*, *The Thing*, *Alien* and even *Casper* jingling along in the background. The only real gripe is that the small monochrome graphics do let the side down a little bit. Overall, this is what every game should aspire to: a gradually increasing difficulty level with that 'just one more go' factor.

Also available free from [www.worldofspectrum.org/infoseekid.cgi?id=0028166](http://www.worldofspectrum.org/infoseekid.cgi?id=0028166).

## Scores (Red Planet)

**Graphics 5**  
**Atmosphere 9**  
**Presentation 10**  
**Value for Money 9**  
**Overall 8**

## Scores (Hard Hat Harry)

**Graphics 5**  
**Sound 4**  
**Presentation 6**  
**Overall 5**

## Scores (Request In Peace)

**Graphics 5**  
**Atmosphere 9**  
**Presentation 10**  
**Value for Money 9**  
**Overall 8**

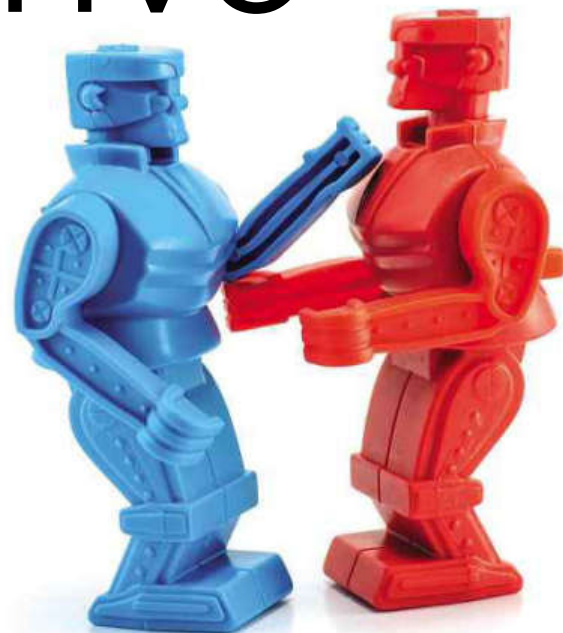
## That's All Folks!

Next month will, rather incredibly, celebrate a year of my Retro Round-Up columns. This year we've taken a look at no less than 75 new games for 'old' machines – and, I suspect, we barely scratched the surface. For hundreds more new and old retro games, make sure you take a look at my YouTube channel [everygamegoing](http://everygamegoing), which is where each of the above YouTube links redirect. See you next time! [mm](http://mm)

# App Battle

## Google Drive versus Dropbox

**The two biggest file-storing apps go head to head as Rob Leane pits Google Drive against Dropbox...**



PAISAN HOMHUAN / Shutterstock.com

It's not unusual for two or more hugely popular apps to offer incredibly similar services. In fact, it happens all the time. One such example is file storage, where the two frontrunners are Google Drive and Dropbox.

The basic versions of these apps are both free, and they each allow you to store and share your files securely via the cloud, using your phone. Both of them also connect to your computers when necessary, meaning you can create a file on your computer, upload it from there and then download it onto your phone or tablet – and vice versa.

Both apps are familiar names in offices around the world; they come in handy for collectively pooling resources in businesses big and small. If you were wondering, Dropbox came first by a significant distance. Although different versions have been built over the years, the original Dropbox launched in September 2008. Google Drive – a contender to the throne of file sharing – cropped up in April 2012.

In terms of market share, Google Drive and Dropbox each have over 200 million users. Some people even use both. But is

there much difference between the two? Is there any reason to pick one over the other? Let's see.

### First Impressions

These are two apps that I've used in a previous office-set life, but I was surprised to see that both of them have been upgraded a little since the last time I used them. First, I downloaded Dropbox onto my phone to get a feel for it again.

Once inside the app (I logged in using an existing account, but it doesn't take long to set up a new one either), I was prompted about whether I want to 'enable camera upload,' meaning: do I want to let Dropbox back up all the photos I take on my phone automatically? You can choose not to do this, but I decided to give it a go.

There's also an option to set a passcode for Dropbox if you want your files to be extra safe. I didn't opt to do this, but I can see how it might be useful for those stashing important corporate information to have this added layer of security.

I chose to connect Dropbox to my computer, which opened a free, easy-to-

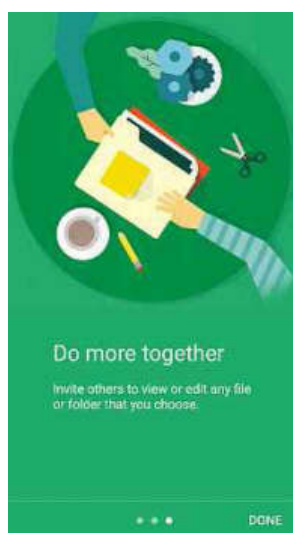
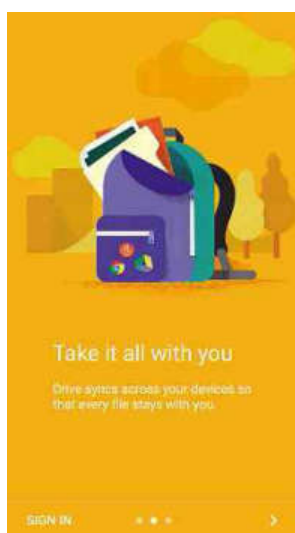
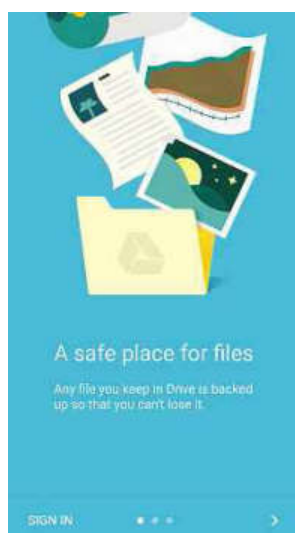
follow instructions dialogue that told me how to do this. It involved scanning my computer screen with my phone's camera, which felt very cool and futuristic. The subsequent PC download took a few minutes longer than the phone version, but not so long that it became an annoyance.

Once you're in on both devices, it's very easy to use Dropbox. Drag a file onto there on your computer; you will have it on your phone the next time you log into the app. All my phone pictures were now backed up on my computer, within minutes.

Google Drive is similarly easy to get to grips with, especially if you already have a Google account (as in a Gmail address). Once you've downloaded the app, you only need to click on the suggested profile (assuming you already use Gmail and Chrome on your phone, if you're a Google







regular). If you're not a Google user already, it'll only take you a few minutes to get signed up for free.

On first impression, as I was signing in, it was noticeable that Google Drive was more colourful. There are bright graphics up at the top that stand out a little more than the muted illustrations on Dropbox.

Similarly to Dropbox, you'll be asked to decide whether to back up your photos using Google Drive, and whether you want to do this exclusively when there's a wi-fi connection available or all the time. I made the same choices as before, and I was then asked if I wanted to save these photos at their original quality or compress them slightly. If I compressed them, I could save unlimited photos. If I wanted the bigger files, then there was a quota. I chose to compress them and save space, as I'm not exactly a photography buff.

Within seconds, I was looking at files that I saved on Google Drive years ago. These were forms and files that I downloaded from my Gmail account at the time, and they were still there, all present and correct. That's some proof, then: the file storage element does indeed work.

**Winner:** It's a tie on first impressions. Both apps are incredibly easy to sign up for, and I was able to store and share files instantly once I was in.

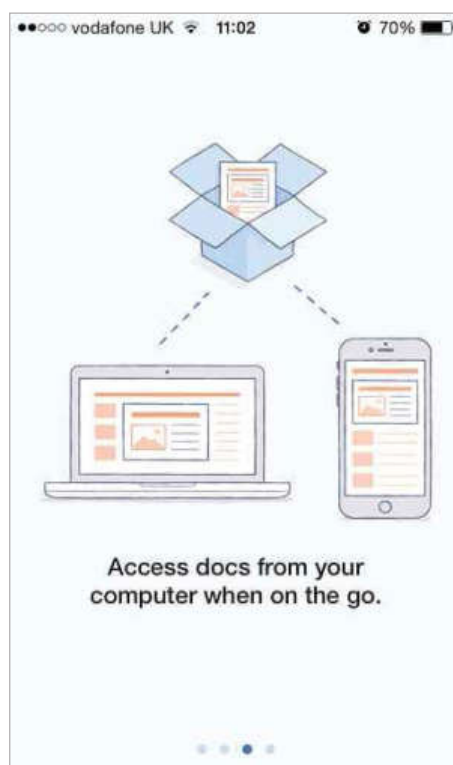
## Differences

Right then, it's time to play spot-the-difference. To my memory, the biggest difference between Google Drive and Dropbox from when I used to use these apps at work was that the former allowed you to collaboratively edit documents in real time, while the latter relied on each member of the team downloading the document separately and doing their

work. I decided to check if this was still the case.

Google Drive does indeed offer a brilliant co-working solution. If you share a document with a colleague or colleagues via Google Drive, you can all then work on it at once. Each member of the team will be named and colour coded, and you can see the changes your colleagues are making in real time.

If your whole team needs to have input on one document, this is a very handy way of keeping everyone up to date and on the same page. It's a neat solution for that classic office problem – the one where you end up with hundreds of different versions of the same file. Which is which? Which



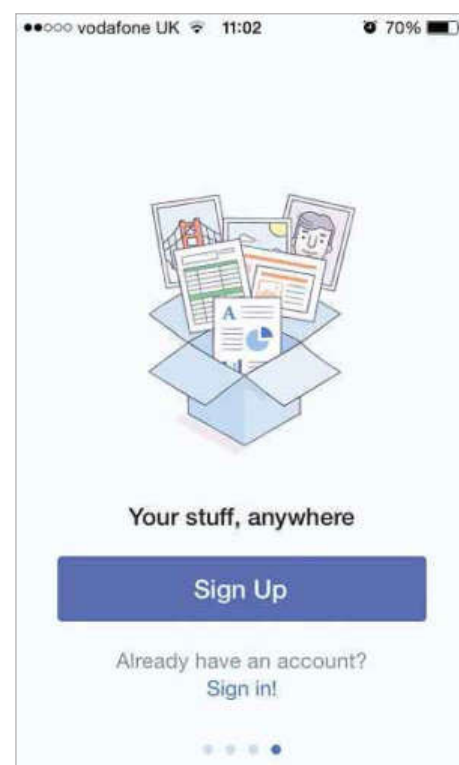
is the current version? You needn't worry about that with Google Drive.

Dropbox still doesn't offer an equivalent to this. While anyone with your login details can get in and upload or download files, you can't collaboratively edit a document at the same time. Using the Microsoft Word app on your phone, you can individually edit documents saved on Dropbox, but you can't do it as a team. That's a big tick in the 'pro Google Drive' column.

Although both apps are free, both also have payment schemes for large businesses. Without one of these packages, there will be a cap on the amount you can store on Google Drive or Dropbox. On Google Drive, the biggest price plan offers 30 TB for \$299.99 per month. On Dropbox, a team of 5 or more can use unlimited storage for £11 per person per month.

**Winner:** It's a close call, but we think Dropbox just about wins this round. There's no doubt that Dropbox has Google Drive beaten for value for money, but it's worth noting that Google Drive's real-time document collaboration is a killer feature.

**Overall winner:** Dropbox wins in our comparison, and would definitely be better for bigger businesses that need lots of storage. If you only work in a tiny team who just wants to occasionally edit documents together, though, Google Drive is probably for you. **mm**





# The 10 Best Star Wars Games For PC

**Rob Leane finds the best of the best from a gaming galaxy far, far away...**

**S**tar Wars: *The Force Awakens* is just around the corner; it will arrive worldwide in mid December, just in time for Christmas. However, you could be forgiven for not being able to wait that long. The teasing trailers and the onslaught of online rumours may well have you champing at the bit for a slice of *Star Wars* action.

Thankfully, you can simulate a thrilling *Star Wars* experience at home, on your own computer. This is thanks to the vast history of videogames by LucasArts, which managed to infiltrate pretty much every genre – through collaboration with big games developers – before Lucasfilm and all its subsidiaries were bought by Disney in 2012.

The universe created by George Lucas has inspired countless new videogames over the years, ranging from spaceship shooters to incredibly detailed RPGs. From massively multiplayer communities to intense private experiences, *Star Wars* has proved a fertile ground for imaginative game makers.

To help you choose a title to pick up while you wait for Christmas, Micro Mart has replayed and reviewed all the classics. Here's our top ten...

## **10: The Force Unleashed: Ultimate Sith Edition (2009, LucasArts/ Aspyr Media)**

While there are entire series of role-playing games (RPGs), shoot-'em-ups and spaceship simulators based in the *Star Wars* universe, one genre has proved particularly difficult to master – a traditional action adventure title. Perhaps that's because we already have the action adventure side of things covered by the movies.

*The Force Unleashed* was an admirable attempt to bring this genre successfully to the *Star Wars* universe. It's set between *Revenge of the Sith* and *A New Hope*, and it lets you play as Starkiller, Darth Vader's secret evil apprentice, who's sent on an array of missions by the Sith Lord. Mainly, these involve tracking and despatching Jedi Knights, who managed to escape unscathed from Order 66.





▲ *The Old Republic*



▲ *Republic Commando*

“ The universe created by George Lucas has inspired countless new videogames over the years ”

The game gifts you with various visually pleasing Force powers, which is pure wish-fulfilment for fans. Although the gameplay gets a little repetitive, this remains the closest we have to a *Star Wars* equivalent to *Uncharted*. *The Ultimate Sith Edition* includes extra expansion pack material too.

## 9: The Old Republic (2011, BioWare)

It might not hold the legendary status of the *Knights of the Old Republic* RPGs that preceded it (or *Galaxies*, the online game that it replaced), but *The Old Republic* is an achievement that demands respect. It's a massively multiplayer online role-playing game (MMORPG) like no other. It allows you to create and control your own character within the sprawling ancient history of the *Star Wars* universe.

It's set 300 years after the game *Knights of the Old Republic: The Sith Lords* and more than 3,500 years before the Skywalker saga of the film series. It's a period of tenuous peace in the galaxy and a time where Jedi are just about managing to hold the universe in check. As such, it's a terrifically unrestrained world for *Star Wars* fans to play in.

The joy is in the detail here, as *The Old Republic* offers something for pretty much everyone. Dark side or light, Jedi or smuggler, huge fan or casual follower – you'll all find something to enjoy in this galactically scaled gaming experience.

## 8: Republic Commando (2005, LucasArts)

Essentially *Halo* meets *Star Wars*, this tactical first-person shooter thrusts the player into the life of a clone trooper in the prequel trilogy world. Specifically, it's set during the Clone Wars conflict that kicked off during *Attack of the Clones*. You get to play through two years of warfare as the leader of Delta Squad, an elite group of clone soldiers.

You shoot your way through the *Star Wars* universe from the thrilling perspective of one man on the ground. Similar to the *Metroid Prime* series, you explore these battlegrounds through a heads-up display from inside an iconic white helmet.

Although the multiplayer gameplay leaves a little to be desired, *Republic Commando* is a great example of a game that offers tension and excitement without the use of the Force or lightsabers.

## 7: Rogue Squadron (1998, Factor 5/LucasArts)

The demo version of *Rogue Squadron* used to come as a freebie disc with certain Windows PCs. From the first time this writer played it, he was hooked; I doubt I'm the only person who picked up the full game based on the strength of that demo. It isn't the first or last *Star Wars* game to offer the experience of playing as a spaceship pilot, but *Rogue Squadron* is certainly among the best.

Set during the original trilogy and inspired by the *X-Wing Rogue Squadron* comic book series, this game essentially plunks you in an X-Wing, shoves you into a battle and lets you work out the rest for yourself. You actually play as Jedi Knight and saviour of the galaxy Luke Skywalker, but the thrill here isn't Force-based at all; the fun's all found by piloting your way through iconic battle scenery.

Simple to control but difficult to master, *Rogue Squadron* is any easy way to kill time. The original is still better than its spiritual successor *Episode I: Battle For Naboo*. The two *Rogue Squadron* sequels – only available on GameCube – are also worth a try.

## 6: Battlefront II (2004, Pandemic Studios)

Like *Rogue Squadron*, *Battlefront* spawned a franchise. The second game in the series is undoubtedly the best. *Battlefront II* brought back one of gaming's greatest genre mash-ups, blending the epic space opera of *Star Wars* with the shooting gameplay of *Call Of Duty*.

The result of this combination is a games series where you can happily blast your way through the iconic ground-level battles of the *Star Wars* saga. Unlike its predecessor, *Battlefront II* offers a little more story alongside the no-holds-barred action.

This time, you follow the battles of the 501st legion of clone troopers as they complete missions for Chancellor Palpatine and



▲ *Rogue Squadron*



▲ *Battlefront II*



▲ *Knights of the Old Republic II: The Sith Lords*

occasionally intersect with the events of the films. The online multiplayer isn't perfect, but that's the game's only real weakness. The 2015 *Battlefront* reboot, which lands this November, should remedy that. In the meantime, you could do much worse than trying out *Battlefront II*.

### 5: *Knights of the Old Republic II: The Sith Lords* (2005, Obsidian Entertainment)

The *Sith Lords* is the second game in the *Knights of the Old Republic* series. Like its predecessor, it's an RPG set thousands of years before the original films. In this game you get to play as an exiled Jedi who's been kicked out of the Order after doing some seriously bad things prior to the events of the playable story.

Of course, the game offers you a chance to right your character's past wrongs and set the universe straight. It's worth noting, though, that you can equally choose to follow a dark path and conquer the galaxy, should you decide to embrace your character's evildoing past.

The game's plot focuses on the Sith returning to power, and you're pitted against an array of baddies as the game goes on. A suspicious, creepy and Force-sensitive old woman named Kreia guides you the whole way, along with a ragtag bunch of more likeable characters.

Although the game's rushed initial release resulted in some frustratingly unwinnable side missions (an arc about a droid factory led to an infuriating dead end), there are now ports that can help finish the story if you look online. With that sorted, there's an incredibly enjoyable time to be had here. Rarely does a game let you explore the *Star Wars* universe in such detail and depth.

If you like this, try *The Old Republic* (ranked ninth in this list), the MMORPG that offers further exploration of the galaxy and a few answers to *The Sith Lords'* unanswered questions.

### 4: *Dark Forces* (1995, LucasArts)

We could write a whole separate article judging the merits of each individual game in the much-loved *Star Wars: Jedi Knight* series, but the original game in this five-part franchise remains one of the best. We're talking, of course, about *Dark Forces*.

As the first official first-person shooter to inhabit the *Star Wars* universe, *Dark Forces* is a game that hugely expanded the potential for gaming excellence under the banner of LucasArts. It also introduced us to a hero for the ages: Kyle Katarn, a former Imperial officer who left the nefarious organisation to become a mercenary.

His first outing, *Dark Forces*, steers clear of giving him Force powers (that would come in the next game, *Jedi Knight: Dark Forces II*), and instead made him a sharp-shooting maverick on a mission to right his wrongs, after discovering that the Empire was responsible for the death of his father.

The narrative of *Dark Forces* weaves incredibly close to the films, revealing that it was Mr Katarn who infiltrated an Imperial base and stole the Death Star plans, allowing for Princess Leia to initiate the mission that would bring down the deadly space station.

Although the events of this game aren't considered canon (a new version of the Death Star plan-stealing mission will be told in the upcoming movie *Rogue One*), *Dark Forces* remains a thrilling adventure with great design and challenging gameplay.

If you like it, try *Jedi Knight: Dark Forces II*, the Force-powered follow-up that pits Kyle against the Sith that killed his father.

### 3: *X-Wing* (1993, LucasArts)

Again, there's a whole franchise that followed this one, and there's bound to be people who would hold *TIE-Fighter* or *X-Wing Vs. TIE Fighter* in higher regard than the game that came first. However, for this writer, nothing quite tops the original, *X-Wing*.

This game – the first disc-based *Star Wars* game ever – introduced us all to the concept of a spaceship simulator set in a galaxy far, far away. It inspired not only its own series of sequels



▲ *Dark Forces*





▲ *X-Wing*



▲ *Jedi Knight II: Jedi Outcast*

but also the space combat systems of countless other *Star Wars* games that followed.

The game lets you play as a Rebel pilot before and during the climactic battle of *A New Hope*, offering three sets of missions that each include 12 or more levels. You're briefed for each mission by a familiar face from the films, and you can pilot an array of iconic spaceships (not just the X-Wing, but Y-Wings, A-Wings and B-Wings too).

At the end, you even get to play as Luke Skywalker in the assault on the Death Star. This marked the first gaming iteration of George Lucas's iconic scene that would become a staple of *Star Wars* spacefaring simulations for years to come (we doubt we've played the last version of it either, with new *Battlefront* game landing this year).

*X-Wing's* graphics look retro today, but they were nothing short of sensational at the time. The game picked up an array of awards and near-universal acclaim. Put simply, it's a must for any *Star Wars* fan.

Also worth a look is *TIE-Fighter*, the equally impressive sequel that lets you play things out from the evil point of view.

## 2: *Jedi Knight II: Jedi Outcast* (2002, Raven Software)

It was a very close call between first and second here, not least because *Jedi Outcast* is an incredible game. This one is arguably the creative pinnacle of the Kyle Katarn saga that started with our fourth-placed game, *Dark Forces*.

Here, Kyle faces off against a Dark Jedi by the name of Desann. The story gets personal when Desann takes Kyle's ally Jan Ors hostage. At this point in the series, Kyle has left the ways of the Force behind and is easily overpowered during his rescue attempt.

It's time for some Jedi training, then, and then some good old-fashioned revenge.

*Jedi Outcast* offers one of the best Jedi experiences going, combining an array of Force powers with thrilling missions and a selection of big name characters from the films to interact with. Luke Skywalker even appears, imparting some wisdom to Kyle at a crucial point in the story and later helping him out on his quest.

The multiplayer material is fun, but the lightsaber combat is the standout feature here. Arguably, it's the best approximation of *Star Wars'* iconic duelling scenes that you'll ever find in a game.

In *Jedi Outcast*, you can vary between light, medium and heavy lightsaber combat stances, allowing for varying techniques and challenging difficulty levels. This isn't one of those games where the characters just whack each other repeatedly; there's a skill and finesse to the fighting that feels worthy of the *Star Wars* brand.

I'd also recommend *Jedi Knight: Jedi Academy*, the almost-as-good sequel where you play as a pupil of Kyle Katarn.

## 1: *Knights of the Old Republic* (2003, Bioware)

From the company that went on to make *Mass Effect* and *Dragon Age*, *Knights of the Old Republic* (*KotOR*) is the perfect *Star Wars* gaming experience. You begin the game as a Force-sensitive amnesiac (their gender and appearance are your choice), awakened on a ship that is under attack from Sith forces, centuries before the familiar events of the films.

This distance from the established canon makes *KotOR* wonderfully unpredictable. As for story, a string of interlinked missions sees you searching for information regarding the Star Forge, a mysterious source of power at the disposal of the big, bad Darth Malak.

Along the way, you pick up the finest selection of playable side characters ever seen in *Star Wars* gaming. These include sarcastic pilot Carth Onasi, sassy Jedi Bastila Shan, loyal Wookiee Zaalbar, battle-thirsty Mandalorian Canderous Ordo and, best of all, human-hating assassin droid HK-47, who wields a massive gun and an arsenal of hilarious dialogue.

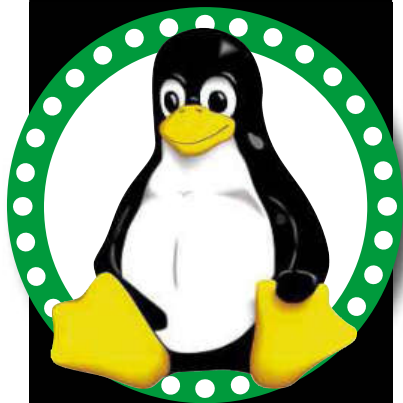
With this team, you have to find your way to the Star Forge and try to stop the nefarious schemes of Malak. Gang leaders, bounty hunters and Dark Jedi will get in your way, while the addictive mini-game Pazaak (essentially blackjack for the *Star Wars* universe) will attempt to distract you from the story.

Speaking of which, for all the cool characters and fun force powers (there are loads, by the way), the narrative of *KotOR* is its greatest strength. Full of twists, turns and changes of allegiance, this one will keep you on your toes until the end. It's like playing through your own personal *Star Wars* movie.

And, of course, *KotOR's* sequel, *The Sith Lords* is also worth playing, and MMORPG spin-off *The Old Republic* offer more adventures in this addictively unguessable period of *Star Wars* history. They may just leave you hoping for *KotOR 3*, though. [mm](#)



▲ *Knights of the Old Republic*



David Hayward has been using Linux since Red Hat 2.0 in schools, businesses and at home, which either makes him very knowledgeable or a glutton for extreme punishment

# Linux

# SteamOS Final

## Is Valve ready for the SteamOS release?

**M**any of us will have already played around with SteamOS and the newer version, SteamOS 2.0. While most people like the interface and the Valve elements that are implemented into the distribution, some have had a more difficult time getting to grips with it.

Reading through the SteamOS forum, and a number of other forums, there are plenty of people who have great things to say about the operating system. We've found it to be worth installing and using, and although it has been a little flaky at times – depending on the machine we've tested it on – it is, on the whole, generally stable and usable.

Naturally, the OS won't work perfectly on every system that's currently available; the same would apply to Windows too. However, with some of the problems that have been pointed out, we're wondering if SteamOS will be ready for the November launch of the official Steam Machines.

### The Good

SteamOS 2.0 is going to be Valve's big gamble for living room and gaming domination in the next year. Despite Nvidia's new Shield, there's still a lot of faith in the whole Steam Machine and SteamOS project.

The new update, to 2.40, sees various fixes and updates, plus an intriguing addition in the form of an auto-repair function. The auto-repair will work when a package configuration or installation has been interrupted for some reason, or when a driver build has been interrupted and results in the system not rebooting correctly.

The auto-repair will effectively take over, and attempt to repackage, install and configure whatever needs fixing, and it will not apply any updates on the system shutdown until the user has requested it.

This is an interesting addition, where the user will have to explicitly acknowledge the SteamOS alert in order to apply the update, rather than the previous way of having SteamOS update itself at shutdown.

One of the major updates in recent months is the addition of more advanced driver packages for AMD and Nvidia, and more specifically the relevant drivers for the new Steam Controller.

Valve has put a lot of effort into making sure the basic building blocks of its range of PC gaming machines is ready from the off. The foundation of GPU drivers, complete with the main controller, goes to show that Valve is at least still committed to the project, despite the length of time it has spent getting it off the ground.

### The Bad

Unfortunately, there are some problems with SteamOS too. These usually come in the form of sudden crashes;

an unusable system; drivers not implementing correctly; problems with the networking, power and reboot; and odd login problems too. In effect, it's the usual kind of stuff a working Linux distro deals with on a daily basis – especially one that's being tested by thousands of users.

However, that deadline is looming, and unless Valve has an ace up its sleeve and can suddenly come up with the goods in time, then there could be some rather unhappy new Steam Machine users out there.

### Will It? Won't It?

We'd like to think that SteamOS is going to hit the ground running and perform magnificently. True, there will be teething problems; there normally are. But on the whole, we're quietly confident in what Valve has invested in.

But what about you? Do you think SteamOS will be ready and will deliver on the Valve promise of the ultimate living room media and gaming centre? Let us know at the usual address.

Until next week.

▼ *SteamOS looks the business, but will it be ready?*





# Under The Spotlight

**Apple describes its search tool as "even more versatile", so why does it still disappoint?**

**A**t the time of writing, I'm just coming up for air, having spent two solid days updating text for a Mac 'bookazine'. Pages that once said 'OS X Yosemite' have been cunningly updated to say 'OS X El Capitan', and new screen grabs have been taken. On occasion, some actual new words were required, in order to take into account the OS X's new features.

One of the biggest changes was supposed to be Spotlight. Apple's search tool when first revealed was quite exciting: a system that rifled through your entire hard drive and enabled you to find things based not only on filenames but also content. More recently, context has become a driving factor in further improving Spotlight, although Apple's technology has arguably been eclipsed by a number of major rivals and indies.

With El Capitan, Apple had the chance to speed ahead or at least make up lost ground, but Spotlight still seems like an annoyingly clunky and finicky system. It now enables fast access to weather forecasts and sports results, but the former after being accessed dozens of times still requires

all of 'weather' to be typed out, whereas the latter needs oddly specific wording to get at the information you're after. Elsewhere, video search is useless, requiring absurdly accurate wording and only ever providing a single result. And that you can search for stock prices feels almost like an in-joke, given Apple's steadfast refusal to let you even hide Stocks on an iPhone, let alone get rid of it entirely.

It's not that Spotlight hasn't improved, because it has. The weather and sports stuff is clunky, but you can fairly quickly get to information when you know how to phrase things. Similarly, Apple's new support for natural-language search can sometimes (although very much not always) provide you with precisely what you're after – for example, if you ask it for photos you took in March or a presentation you worked on last week. But if you've any experience outside of the apps that come installed on a Mac, you might be wondering what all the fuss is about.

For years now, third-party products have enabled lightning-fast access to local files. LaunchBar 6 ([obdev.at/products/launchbar](http://obdev.at/products/launchbar)) in

particular has insanely speedy filtering, QuickSilver ([qsapp.com](http://qsapp.com)) provides a powerful 'find and do' actions system, and Alfred ([alfredapp.com](http://alfredapp.com)) offers a very usable search tool that now comes across rather like Spotlight Pro, what with Apple's Spotlight closely aping Alfred's visual appearance. But two further things that stand out about these third-party tools is that they offer plenty of configuration and extensibility. These things remain anathema to Spotlight. You can stop groups of content showing up in search results, and that's about it.

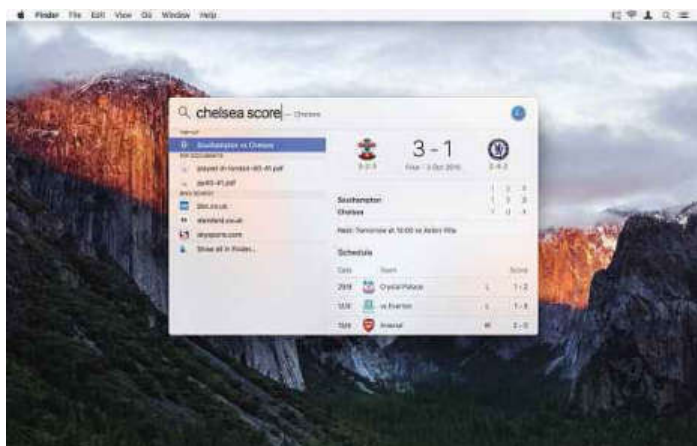
It needn't have been like this. Not long ago, Flashlight ([flashlight.nateparrott.com](http://flashlight.nateparrott.com)) quietly appeared. A hack of sorts, it injected itself into Spotlight and provided the means to add plug-ins. Although not a full replacement for the aforementioned utilities, Flashlight boasted enough features that many users were suddenly happy using Spotlight again, purely because they could make it do a little more of what they wanted. Sure enough, Apple took an axe to Flashlight. First, support was obliterated in an OS X Yosemite update, and then OS X El Capitan blocked apps of this kind entirely. Spotlight is, once again, a walled garden. This wouldn't be so bad if Apple had done more than merely borrow Alfred's visual appearance and add some sports and weather results. But as it stands, Spotlight's hogging the limelight despite still being the weakest act from everything mentioned in this column.

*< Spotlight: rather disappointing in El Capitan. (Doubly so for any Chelsea fans in early October!)*



**Craig Grannell is a writer, designer, occasional musician and permanent loudmouth. He's owned Macs since 1996, when Apple was facing certain doom, and is therefore pleasantly surprised by its current success. Find Craig on Twitter at @craiggrannell**

# Mac





Ian is a professional IT analyst, a semi-professional writer and a pretty amateur electronic musician. He likes gadgetry and loves making gadgets do things they were never designed to do

# Mobile

## The PC In Your Hand

**Windows Phone might still not be huge but, as Ian McGurren finds, that's not stopping Microsoft**

**W**ere it from a smaller company, by now Windows Phone may well have become a fondly remembered footnote in the history of mobile operating systems, probably alongside WebOS. But while Palm was no small fry, it was no Microsoft either, and if there's any company that is going to keep pushing a product it believes in – against the odds – it's Microsoft (see also the Apple TV). Thankfully, Microsoft's support of Windows Phone is not purely out of some face-saving vanity; it's killed off many products, both successful (Zune, Hotmail, Flight Simulator) and not so successful (IE6, Bob, Windows Me, Works, Kin and XB1 DRM), but it does genuinely appear to believe in and support its mobile OS. Whether that's a good or a bad thing depends on how you view the OS (or if you have MS shares), but competition is always good in this increasingly small sector, and for its faults, Windows Phone offers a completely different way of doing things.

It comes as no surprise, then, that at Microsoft's recent event, two new flagship devices were revealed, the Lumias 950 and 950XL. It will also fail to surprise you that they are attractive, powerful and competent devices. What might surprise you, however, is that, in true PC-style, they're liquid cooled!

Starting with the 950, it's the 'smaller' of the two, although that is a very subjective use of the word, as big specs come thick and fast. The 5.2" screen is not only a full 2560 x 1440 (564ppi) QHD panel, but it's also AMOLED, a

screen tech Windows Phone's UI shines on. The CPU is the same chip that's featuring in many other 2016 flagships, Qualcomm's hexa-core Snapdragon 808. Already powerful on Android, Windows Phone is especially well optimised and may barely tax this chip. Coupled with the new cooling method, this could lead to power efficiency savings. But if you do run down, the fast charge circuit will give you 50% of the charge back in 30 mins. Topping it off is a 20mp Zeiss-equipped rear camera that boasts a 'Rich Capture' mode for better automatic image capture. From the release images, it's certainly doing the Lumia Pureview heritage no disservice. If moving video is more your thing, 4K capture is also standard.

The detectives among you might have deduced the Lumia 950XL as possibly being a bigger version of the Lumia 950, and you'll be less surprised to find that yes, you're right. Mostly. The screen gains half an inch, from 5.2" to 5.7", though there's no change to the resolution, so you'll just have to put up with the mere QHD on offer! The CPU also gains, going from six cores to eight, so given the lack of screen bump, it really should be around one third more powerful. The rest mirrors

the 950: 32GB storage, 3GB RAM and a 20mp camera. Style wise, it's much the same as the 950: attractive but not jaw dropping.

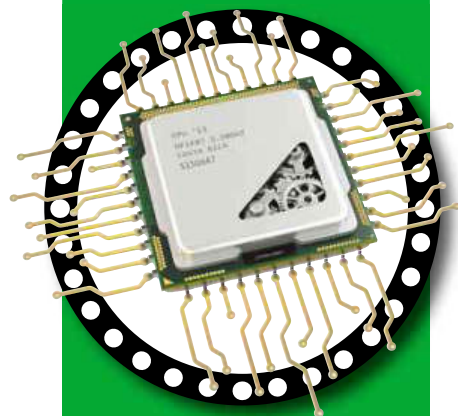
But what could be jaw dropping is both handsets' support for Microsoft Continuum. Used in conjunction with the new MS Display Dock, the phones link to the dock device, as does a keyboard and mouse and, via DisplayPort, a screen. The phones then offer not a simple external display function but a feature that's essentially similar to the docking feature of the Ubuntu phone, only here it's a basic version of something that resembles Windows 10. For many, it's not of much interest, but for enterprise, the possibility of a phablet that doubles as a PC could be a very interesting concept.

The Lumia 950 range aren't really breaking any ground, but they are two well-made, high-quality handsets that'll delight Windows Phone fans and possibly appeal to a few others. The addition of Continuum is a very interesting move, however, and while it might only be of interest to enterprise users now, future consumer handsets may also offer this, creating a very interesting way of getting Windows into the hands and desks of the world again.





# Actioncam for An Action Man



**Forget beards. Andrew Unsworth says real men wear an actioncam**

If you have a Synology NAS device and fancy helping the company out while getting a first-look at the latest operating system, you should become a DSM 6 beta tester. There's even a prize of a Synology DS215j for the people who provide the most valuable feedback.

Synology says DSM 6 will be more efficient, with better performance, thanks to its 64-bit architecture (used on compatible models) and the modularisation of applications. There are a number of new features too, which provide virtualisation and the ability to migrate virtual DSMs from one device to another more easily, better replication that allows data to be backed up to remote locations up to every five minutes, an improved mail server and offline transcoding of media files.

There's even the ability to collaborate with colleagues using a spreadsheet app that can be accessed via a web browser. The spreadsheet is essentially like using a Google spreadsheet, except it's created and stored by your Synology NAS. Meanwhile, Notestation lets you create documents that contain charts and graphics. These may not replace Google Docs and Google Drive, but they'll certainly be useful. DS Note is a mobile app that works with the Apple Watch. Users can create a new note by issuing a voice command to the Apple Watch and search for existing notes, among other things.

To download the beta and find out more about DSM 6, point your browser to [tinyurl.com/njtoqvh](http://tinyurl.com/njtoqvh).

## Tomtom Actioncameo

Actioncams are brilliant devices. You can attach one to your head to prove you really were stupid enough to ollie that staircase railing, to your dashboard to show footage to your insurer should the worst happen and you crash, and to a robotic vacuum cleaner so you can see how it's done. My dad uses his when he's gliding to record himself putting a perfectly stable glider into a spin to practice recovering from one, which seems odd to me.

However, TomTom is shouting from the rooftops about its 4K Bandit actioncam, because it was used to record part of a short film called Darklight, which can be seen at [tinyurl.com/p6nzzju](http://tinyurl.com/p6nzzju). The film tracks three world-class mountain bikers as they traverse difficult terrain in Utah and Oregon at night.

TomTom's Patrick Stal says, "With stunning footage taking viewers into a world of light and

colour, it was a privilege to be a part of this visually epic film franchise. The overall effect and quality of the video is a powerful masterpiece and a true evolution of its predecessors. From world-class riders to breathtaking moves and landscapes, we're excited to show the world what the future of action sports footage looks like." If you want to see how well the Bandit performs, check out the video.

## Fibre To The Fritz!Box

Finally, it's worth mentioning AVM's new Fritz!box 5490, which is designed for next-generation fibre to the home (FTTH) broadband networks. The 5490 provides speeds up to 1,300Mbps 802.11ac wi-fi speeds, 450Mbps 802.11n speeds and a fully integrated telephone system with an answering machine, among other features. Keep your eyes peeled on the [en.avm.de](http://en.avm.de) website for more info.



Andrew Unsworth has been writing about technology for several years, he's handy with a spanner, and his handshaking skills are second to none

# Hardware



Ryan Lambie has loved videogames since he first stared up in awe at a *Galaxian* arcade cabinet in his local chip shop. 28 years on, Ryan writes about gaming for Micro Mart. He's still addicted to chips and still useless at *Galaxian*

# Gaming

## Reach For The Stars

With more than \$90m now raised, *Star Citizen* is reportedly bigger than every other crowdfunded game combined. The space sim is currently due for launch next year

This week, Ryan takes a look at the progress of the space sim *Star Citizen*, and checks out the multiplayer modes in *Call Of Duty: Black Ops III*...

### Plug & Play

It's strange to think that when *Star Citizen* started its crowdfunding campaign in October 2012, studio Cloud Imperium was seeking a minimum goal of \$500,000. That goal was shattered within days as the pledges flooded in; within a month, *Star Citizen* had already broken the record for most crowdfunded game as its total passed the \$4m mark. At the time of writing, pledges for *Star Citizen* have, as of October 2015, passed \$90m.

Cloud Imperium's space sim seems to thrive on dizzying statistics and stellar ambitions. It aims to be a galaxy-spanning MMO with its own living economy, realistic flight physics and a universe that will evolve and change through the actions of its players. At the same time, it aims to be a first-person shooter and a pure combat sim. Then there's its single-player campaign, dubbed *Squadron 42*, which aims to revive the story-driven space operatics of the classic *Wing Commander* series.

It's the enduring affection for *Wing Commander*, among other games, that has helped usher in the recently reported one million backers it now has. The *Star Citizen* project is led

by Chris Roberts, the designer behind the *Wing Commander* series as well as the thematically similar *Starlancer* and *Freelancer*. But as well as enthusiasm from its fans, *Star Citizen* has garnered no small amount of controversy. Some industry commentators have wondered whether such a sprawling game can possibly live up to its lofty goals. Others have dismissed the game as so much vapourware, a project so huge that it simply can't be finished – a suggestion that has grown after *Star Citizen* missed its original late 2014 release date.

The problem, perhaps, is that *Star Citizen* is a unique project. Games of this size – such as *Grand Theft Auto V*, with its startling \$265m budget – are usually made behind closed doors. Their years of development, tried-and-abandoned ideas and creative struggles take place away from the public eye. What we see of these huge, expensive games is carefully stage-managed. *Star Citizen*, on the other hand, has been under intense scrutiny from the launch of its campaign – and with good reason, you might argue, since it's being developed with players' money.

Through all the anticipation and criticism, the *Star Citizen* project ploughs on. The latest update

from the game's *Squadron 42* solo campaign once again drives home its uncompromising scale; at CitizenCon, *Star Citizen*'s annual fan convention, Cloud Imperium unveiled the campaign's starry cast. *Wing Commander* veterans Mark Hamill and John Rhys-Davies will be joined by the likes of Gary Oldman, Mark Strong, Gillian Anderson, Ben Mendelsohn and Andy Serkis. As well as providing their vocal skills, the actors' motion-captured likenesses will also be zapped into the game.

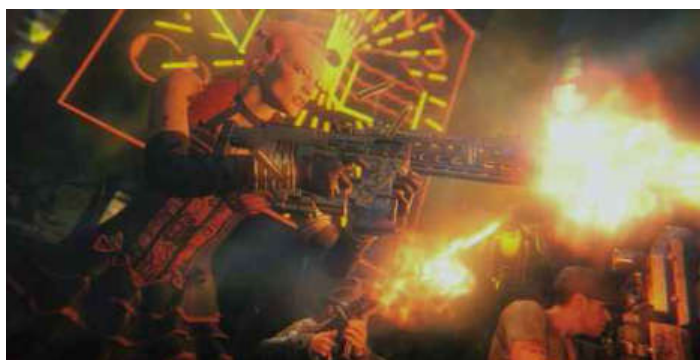
For its critics, *Star Citizen*'s cast will likely be further ammunition: another sign of a game spinning wildly out of control, both financially and creatively. Yet Chris Roberts remains confident that the finished space sim will silence its critics. "When *Star Citizen* and *Squadron 42* are out there," Roberts told the website Polygon in August, "I think the game will speak for itself. The noise we're dealing with now will not be there."

*Star Citizen* is currently scheduled for launch in 2016. *Squadron 42*'s due date has yet to be announced.

### Onlin

*Star Citizen* isn't the only forthcoming game with an





▲ *Black Ops III's* zombie mode takes place in a 1940s city, where exotic dancers and seedy magicians face off against an army of the undead

expensive-sounding cast. Consider too *Call Of Duty: Black Ops III's* zombie mode, which stars the voices and likenesses of Jeff Goldblum, Ron Perlman, Neal McDonough and Heather Graham. They play a quartet of miscreants (Goldblum is a washed-up magician, Perlman a boxer, McDonough a detective and Graham an exotic dancer), who wind up in a battle with the undead as a punishment for their assorted crimes.

*Call Of Duty's* zombie modes have become increasingly eccentric as their budgets have grown (previous outings have taken in John F Kennedy and Fidel Castro, Siberia and the moon), and this latest edition of the undead blaster is no exception.

Called *Shadows Of Evil*, it's set in a benighted city (called Morg, but closely resembling Chicago) in what appears to be the prohibition era. We're in pure hardboiled detective country, with the streets lit up by the sickly glow of neon signs. The major difference, of course, is that your average Raymond Chandler novel didn't feature armies of slaving zombies and towering, Lovecraftian multi-headed monsters.

What immediately springs to mind, as the latest trailer for *Shadows Of Evil* unfolds ([youtu.be/-nusN4tZYoo](https://youtu.be/-nusN4tZYoo)) is that it bears more than a passing resemblance to *BioShock*, with its lurid colour scheme and ever-present 1940s signage

hanging from every wall. Nor is *Shadows Of Evil* the only *Black Ops III* mode to recall another hit game. Treyarch recently unveiled a Free Run mode which, as many have already pointed out, isn't dissimilar to some of the more athletic moments in *Mirror's Edge* or *Titanfall*. It pits players in a race across a futuristic assault course of shiny walls or floors, which have to be traversed with a mix of athletic jumps and perfectly timed pot-shots at switches.

Free Run looks so wildly different from *Black Ops III's* main campaign that it scarcely resembles a *Call Of Duty* game at all. Nevertheless, it's interesting to see Treyarch attempting to inject new ideas and modes into the franchise's tried-and-trusted FPS formula.

*Call Of Duty: Black Ops III* is out on 6th November.

## Incoming

Unless you're a dedicated collector of the Nintendo Wii's more obscure titles, it's possible that *Little King's Story* passed you by. Released in 2009, it was a simple-looking yet surprisingly deep real-time strategy game,

where you played a diminutive monarch whose goal was to gradually expand his village and conquer the surrounding countryside. *Little King's Story* wasn't a huge hit, but it was nevertheless a delightful and imaginative little title.

It's recently been announced that *Little King's Story* is getting a port to PC courtesy of publisher XSEED, which has long specialised in bringing Japanese games to the West. The project is still in its alpha stage, and given that *Little King's Story* originated on the Wii, it's probably fair to say that it won't be the best-looking title we'll see on the PC. But if the port goes well, then a sorely overlooked RTS game could get a new, more appreciative audience. Indeed, it's sad to think that the original developer behind *Little King's Story*, Cing, went bankrupt shortly after the game's release. Had *Little King's Story* been made for the PC instead of Nintendo's console, it may have spawned the series of games creator Yoshiro Kimura had originally wanted to make.

*Little King's Story* is tentatively scheduled for release in 2016.



▲ Japanese strategy game *Little King's Story* didn't make much of a splash on the Nintendo Wii, but it could find the audience it deserves when it arrives on PC next year

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J. Disorobo, Amazon.com

This is a book about getting rich.

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Very rich indeed.

And now he's going to show you how to do it!



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Sunday Telegraph

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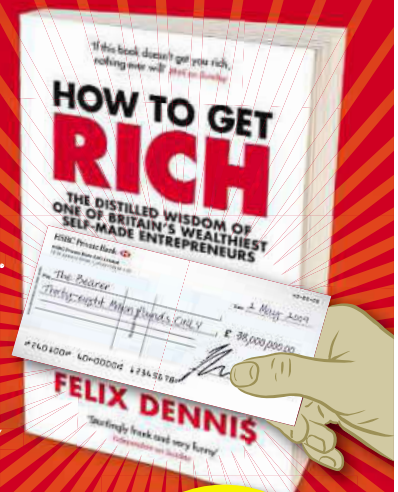
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Write the wording for your advert in the numbered boxes below (one word each box). Maximum 30 words free.  
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1	2	3	4	5	<b>30 Words FREE</b> <b>Private Ads Only</b> <small>Trade ads MUST be boxed or reversed</small>	<b>Boxed</b>		<b>Reversed</b>	
6	7	8	9	10		Private	Trade	Private	Trade
11	12	13	14	15		<b>£6.80</b>	<b>£13.60</b>	<b>£8.00</b>	<b>£16.00</b>
16	17	18	19	20					
21	22	23	24	25					
26	27	28	29	30					
31	32	33	34	35		£1.70	£8.50	£17.00	£9.70
36	37	38	39	40		£3.40	£10.20	£20.40	£11.40
41	42	43	44	45		£5.10	£11.90	£23.80	£13.10
46	47	48	49	50		£6.80	£13.60	£27.20	£14.80
51	52	53	54	55		£8.50	£15.30	£30.60	£16.50
56	57	58	59	60		£10.20	£17.00	£34.00	£18.20
								£36.40	

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Choose a category you would like your advert to appear in and tick the box.

- ☐ Hardware for sale    ☐ Software for sale    ☐ General for sale    ☐ Accessories  
☐ Hardware wanted    ☐ Software wanted    ☐ General wanted

### Step 3

Complete all fields of your personal details and payment method.

Name

Address

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Expiry Date:

Authorise payment for £



**FAX this completed form to: 0207 907 6066**

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# IT

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Dell Latitude E5410 i5 (very fast) 2.4, 4gb ram, 160 gb Hard drive DVDRW fantastic condition. Cheaper than any on Ebay. Very good battery life. You can collect from Manchester or Portsmouth or I can courier out to you next day for an extra £10. Please call or email for any questions. It has Window 7 64 bit installed and activated with a genuine certificate of authenticity Bargain price ONLY £124  
Tel: Dave Thomas (07828) 982930 or (01942) 706571  
Email: [davethomas96@aol.com](mailto:davethomas96@aol.com)

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Tel: David (01616) 888119  
Email: [pcmadnessltd@yahoo.co.uk](mailto:pcmadnessltd@yahoo.co.uk)

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PC Desktop Ram (DIMM) Memory: 64MB Siemens PC100-322-620 MT8LSDT864AG-10CZ5 - Only £8.00  
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Email: [scobie09@gmail.com](mailto:scobie09@gmail.com)

CD Stomper CD/DVD Labelling System: Software, Labels and Label Applicator. Boxed. Unused. £9.  
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Email: [scobie09@gmail.com](mailto:scobie09@gmail.com)

56kb Fax Modem External. £10.00.  
Tel: Gordon (01314) 660205  
Email: [scobie09@gmail.com](mailto:scobie09@gmail.com)

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Tel: Paul (01564) 200162  
Email: [pridding@blueyonder.co.uk](mailto:pridding@blueyonder.co.uk)

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Web: [www.radioactivefair.co.uk](http://www.radioactivefair.co.uk)

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Tel: Ian (01932) 856971  
Email: [a2345@btinternet.com](mailto:a2345@btinternet.com)

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PC Desktop Ram (DIMM) Memory. Siemens PC100 - 222- 620 16M x 64 SDRAM. HYS64V16222GU-8 Only £8.  
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PC Desktop Ram (DIMM) Memory. 64MB Siemens PC100-322-620 MT8LSDT864AG-10CZ5 - Only £8.  
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*Email: pcmadnessltd@yahoo.co.uk*

Dell Latitude Laptop E5421 i5 (very fast). 4gb ram, 160 gb Hard drive DVDRW fantastic condition. Cheaper than any on Ebay. Very good battery life. You can collect from Manchester or Portsmouth or I can courier out to you next day for an extra £10. Please call or email for any questions. It has Windows 7 64 bit installed and activated with

a genuine certificate of authenticity ONLY £110 please add £10 for delivery.

*Tel: Dave Thomas (07828) 982930 or (01942) 706571*

*Email: davethomas96@aol.com*

Dell ultrasharp u2913wmt 29" superwide monitor for sale. Very good condition no scratches or dead pixels, selling due to upgrade to 4k! Lovely ips screen. Original Box with cables/stand £280. Paypal or personal cheque

*Email: llew.lion@googlemail.com*

Acer Aspire 1670 laptop. No hard disc. Otherwise in excellent condition. In laptop bag. £45.

*Tel: David (07901) 994958*

Gigabyte Geforce GTX680. Model GV-N680D5-2GD-B, 2048MB RAM, PCIe x16, bare card, no box. £200 ono. Collection only from Wokingham RG41.

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NVidia Quadro 600 GPU. 1GB DDR3, Dual link DVI-I + Display port. Max. Display at 60Hz + 2560x1600, Direct X 11, Open GL 4.4. The best graphics performance per watt in its class. Big performance, small form factor, and small power consumption. Removed from my working Windows 8 machine. £32.50 incl. Reg. post.

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*Tel: Dave (01206) 298773*

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Non ecc low density laptop memory modules. Double sided ram. Working Laptop pull, Please double check as No returns due to incompatibility. 8GB 2 X 4GB Crucial 204 Pin SODIMM 512Mx64 DDR. CT51264BC1067. M16FD BV1111Z.FS 201106 SU £27.50 the pair incl. Reg. p&p

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Dell Latitude E5420 i5. Very fast 2.5, 4gb ram, 500 gb Hard drive DVDRW fantastic condition. Cheaper than any on Ebay. Very good battery life. You can collect from Manchester or Portsmouth or I can courier out to you next day for an extra £10. Please call all email for any questions. It has Windows 7 64 bit installed and activated with a genuine certificate of authenticity. NEW £125.

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*Email: davethomas96@aol.com*

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*Tel: Paul (07900) 796780*

*Email n-peckdd@5kid5.net*

27" iMac. 2.9 GHz Intel i5, 1TB HDD, 8GB RAM – late 2012 Model (thin edge) iMac in good condition, running OSX Yosemite. No keyboard or mouse.

Supplied in original box. £700.  
Tel: Chris Salter (01707) 880251  
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ANTEC 2800 MIDI-TOWER.  
Black Antec case, Sempron 2800+,  
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2.6ghz Dual-Core, Freezer 64,  
4GB RAM, 160 + 300GB, CD-RW,  
DVD-RW, Floppy, network Card,  
Soundblaster , NVidia , Vista  
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64 bit professional. Only £150 plus  
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via Paypal or cheque or bank  
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very fast.  
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reader fantastic and fast . Genuine  
Windows 7 35 bit professional.  
Only £60 plus £12 for next day  
delivery. Fantastic condition very  
fast.  
Tel: Dave Thomas (07828) 982930  
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Email: davethomas96@aol.com

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DVDCDRW Fingerprint reader  
fantastic and fast , Genuine win  
7 35 bit professional Only £60  
plus £12 for next day delivery.  
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HP 88 Inkjet Cartridges eight  
time expired boxed HP cartridges  
£5  
Tel: Ian (01932) 856971  
Email: a2345@btinternet.com

WD 500GB external USB Hard  
Drive. Excellent Condition. £20  
include P&P.  
Tel: Michael Cunnane (01452)  
303732

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Next Wireless N Modem Router  
kit. Excellent condition complete  
with power supply, network  
cables, telephone cable, ADSL  
filter and setup CD. £10.00.  
Tel: David Ewles (01295) 253554  
Email: david@ewles.gb.com

Laptop for sale. Toshiba Portage  
i5 2.5ghz Model R830-13c 4gb  
memory, 320gb hard drive.  
Wi-Fi, fingerprint scanner,  
HDMI output. Sold on eBay for  
over £200; only £150 plus £15  
p&p. Absolute bargain. Great  
condition. Very light.  
Tel: Dave Thomas (07828) 982930  
or (01942) 706571  
Email: davethomas96@aol.com

ASUS P5QL-EPU Motherboard  
- 775 Socket - DDR2. Tested  
and removed from a working  
environment, comes with I/O  
Plate. £45 inc Free Courier.  
Payment via PayPal.  
Email: info@jmcomputing.info

ASUS P5B Motherboard - 775  
Socket - DDR2. Tested and  
removed from a working  
environment, comes with I/O  
Plate. £35 inc Free Courier.  
Payment via PayPal.  
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SATA 2.5". WESTERN DIGITAL.  
Model: WD1600BEVT. Fully  
tested. Perfect working order.  
Partitioned and formatted NTFS.  
Free postage. Price £22. Paypal  
accepted.  
Email: geofry@tiscali.co.uk  
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Only used as back-up drive.  
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Colour Monitor 20MB Hard Drive  
5.25 Floppy Original Amstrad  
Disks Manuals spare Keyboard  
and Mouse. This is a rare fully  
functioning collectable. £60.  
Tel: (01949) 876235  
Email: hc4203@gmail.com

For sale SKY PLUS and SKY PLUS  
HD REMOTES. Original £7.50  
+ P&P please email or call me for  
more information.  
Tel: David (01616) 888119  
Email: pcmadnessltd@yahoo.co.uk

Corsair Vengeance 16GB  
(2x8) DDR3 Memory  
CMSX16GX3M2A1600C10. Never  
used but box opened. Selling due to  
wrong voltage, these are 1.5V and  
I needed 1.35V. Asking £85.00 inc.  
postage to the UK.  
Email: fabstock1@gmail.com

Used Asus Wireless Router for sale.  
Dual-band 4 x GB Ethernet Wi-Fi  
RT-N66U N-900. £65.00 O.V.N.O.  
Selling cause I have no need for it  
since upgrade to BT Home Hub 5.  
Email: beme12355@googlemail.com

Asus A8V motherboard, socket  
939. Clips holding CPU cooler  
broke, CPU overheated & shut  
down. M/B should be OK and  
there is 4GB of ram on board. Free,  
collect only. North Wales.  
Tel: (01286) 678584  
Email: gw7hav@googlemail.com

2 x 2GB DDR3 1600 Mhz RAM.  
Recently taken from a 2012 mac  
mini. As new £25.  
Email amstereofan@gmail.com

4X1 Gig DDR2 Ram (Ocz Nvidia  
SLI PC2 6400 epp 4-4-4-15)  
for Sale. £40.00 for all 4 + Post/  
Packing. In perfect working order.  
Email: Ken Toole ken.toole1@  
virginmedia.com

## HARDWARE WANTED

Trying to breathe life back  
into an old machine? Why  
not submit a wanted ad to  
**MicroMartClassifiedAdverts@  
gmail.com** and see if any of  
the thousands of computer  
enthusiasts who read the  
magazine each week have what  
you're looking for?

WANTED: You bought a Corsair  
water cooler, with a square block.  
You fitted it to your Intel processor.  
You want to make a few pounds  
from the spare A.M.D. bits?  
Contact me!  
Email: johnnrpeel@gmail.com

WANTED: Gigabyte GA-Z77X-  
D3H motherboard wanted.  
Email: johnbeiry@gmail.com

WANTED: PC Tower case (beige  
colour if possible) to rehome an  
Amiga A1200 vintage computer.  
The Amiga motherboard is H  
410mm x L 190mm (H 16" x  
L 7.5"). PSU not an issue but if  
available 250 watt more than  
enough.  
Tel: Bill (07742) 061569 or (02641)  
769503.

WANTED: 3G dongle for Archos  
80 G9 tablet.  
Email: alancox28231@gmail.com

WANTED: Fractal Design Define  
XL full tower case. R1 (original  
version) in black.  
Tel: (01670) 860146  
Email: mm@tectron.co.uk

WANTED: Bluetooth dongle and  
driver for Philips Crystal 650.  
Tel: (01994) 231112  
Email alancox2823@gmail.com

## SOFTWARE FOR SALE

Sim City 2000: Boxed and original.  
Classic gaming. £15.00  
Tel: Gordon (01314) 660205  
Email: scobie09@gmail.com



Microsoft Office 2000 standard. Upgrade retail box only PART NUMBER 021-02661 £15 NEW AND SEALED. This includes the following WORD, EXCEL, OUTLOOK, POWERPOINT. If you need an upgrade path I can supply one for free. Please add £3 for p&xp.

Tel: Dave Thomas (07828) 982930 or (01942) 706571

Email: davethomas96@aol.com

Windows 7 Professional. I have both 32 or 64 bit versions NEW software and license (certificate of authenticity) 100% genuine and unopened software .ONLY £35 including P & P.

Tel: Dave Thomas (07828) 982930 or (01942) 706571

Email: davethomas96@aol.com

Windows VISTA BUSINESS. New and sealed. software and license (certificate of authenticity) 100% genuine and unopened.(Dell branded but will install on any machine) ONLY £15 including P & P

Tel: Dave Thomas (07828) 982930 or (01942) 706571

Email: davethomas96@aol.com

Windows XP professional. New and sealed . Book, software and license (certificate of authenticity) 100% genuine and unopened.(Dell branded but will install on any machine) ONLY £15 including P & P

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Email: davethomas96@aol.com

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Email: davethomas96@aol.com

Windows 2000 Professional. NEW software and license (certificate of authenticity) 100% genuine and unopened software .ONLY £15 including P & P.

Tel: Dave Thomas (07828) 982930 or (01942) 706571

Email: davethomas96@aol.com

Windows XP HOME. New and sealed . Book, software and license (certificate of authenticity) 100% genuine and unopened.(Dell branded but will install on any machine) ONLY £15 including P & P

Tel: Dave Thomas (07828) 982930 or (01942) 706571

Email: davethomas96@aol.com

Windows 7 Home Premium 32 bit versions. NEW software and license (certificate of authenticity) 100% genuine and unopened software .ONLY £35 including P & P.

Tel: Dave Thomas (07828) 982930 or (01942) 706571

Email: davethomas96@aol.com

Adobe Photoshop Elements and Premiere Elements 12 Full Version - Windows/Mac. Original Boxed CD with unused product key. £47.50

Tel: Ian (01932) 856971

Email: a2345@btinternet.com

PCB design software. 127 layers, schematic entry, PCB entry, PCB to Gerber file converter, output to printer. £9.99

Tel: Nigel Wright (07967) 527693

Email: cresswellavenue@talktalk.net

Microsoft Office 2013. Original Software only £100.

Tel: Gordon (01314) 660205

E-mail: scobie09@gmail.com

Sim City 2000. Boxed and original. Classic gaming. £15.

Tel: Gordon (01314) 660205

E-mail: scobie09@gmail.com

Windows 7 Ultimate 32 bit version . NEW software and license (certificate of authenticity) 100% genuine and unopened software .ONLY £ 45 including P & P,

Tel: Dave Thomas (07828) 982930 or (01942) 706571

Email: davethomas96@aol.com

Cyberlink PowerDVD 12 Standard. Runs under Windows 8, 7, Vista or XP. Original CD with unused product key £7.50

Tel: Ian (01932) 856971

Email: a2345@btinternet.com

Nuance Omnipage 18. OCR Runs under Windows 8, 7, Vista or XP, Original CD with unused product key £25.

Tel: Ian (01932) 856971

Email: a2345@btinternet.com

Acronis True Image Home 2012. Bootable CD. Application runs under Windows 8, 7, Vista or XP. Original Acronis CD with unused product key £5.

Tel: Ian (01932) 856971

Email: a2345@btinternet.com

Norton Family Premier 2.0. Runs under Windows 8, 7, Vista or XP, Original Symantec unused product key £15.

Tel: Ian (01932) 856971

Email: a2345@btinternet.com

## SOFTWARE WANTED

Wanted: Instructions! A couple of long shots, but does anyone have instructions for the TEXET T581 BN programmable scientific calculator or the ZOOSTORM Fizzbook NL2 model [not the one available on the net - wrong model]?

Email: Alan Cox alancox28231@gmail.com

Wanted: PictureToExe software, for making picture shows.

Tel: (01202) 610602

Email: ivor.mary@talktalk.net

Wanted: Quicken 2001. I desperately require a copy of QUICKEN 2001, UK Edition. I need to reinstall the program but have lost my original installation CD.

Email: david.maddams@icloud.com

Wanted: I have a BCL 2.4g Wireless Gaming Mouse, Model: RF0P77 (3v 7ma) but no Drivers. Can someone help with a copy of the Original Drivers for this Wireless Mouse please!

Email: Cliff Evans

cliffordevans603@btinternet.com

Wanted: Driver disc for Toshiba L30-11D PSL33E laptop. Laptop useless without drivers but only worth £40, so cannot pay a lot.

Tel: John Udall (01384) 824494

Email john.udall@blueyonder.co.uk

## IMPORTANT BUYING ADVICE

**We work very hard to police our classified ads, and make them as secure as possible. However, please do your bit too and use the following guidelines:**

- **Never - NEVER** - pay by bank transfer or post out cash, unless you know the trader already, or are sure it is okay to do so. Pay by cheque, Paypal, Nochex etc wherever possible.

- Be wary of anyone who insists on you paying by the above methods if in doubt, get us to check them out by mailing editorial@micromart.co.uk

- Keep copies of all correspondence

- When sending out goods, at the least obtain a certificate of posting from the Post Office

**If you are in any doubt, feel free to send us a mail via editorial@micromart.co.uk.**

**Every year, thousands of successful transactions take place through our classifieds, and that's just how we like it.**

**Help us help you keep them one of the safest and most secure places to buy and sell computer kit.**

# ASK AARON



**Meet Aaron Birch. He's here to help you with any general upgrading, software and system building problems. He's got advice aplenty and you're very much welcome to it!**

Send your questions to:  
Aaron Birch  
Micro Mart  
Dennis Publishing  
30 Cleveland Street  
London  
W1T 4JD

Contact Aaron by email at:  
aaron@micromart.co.uk

Please try to keep your queries brief and limit them to just one question per letter, simply so we can squeeze in as many as we can each week. Please include relevant technical information too.

*Aaron*

## Underpowered PSU

I wonder if you could help me please. I have just bought myself a Sandy Bridge i7 HP Elite 7300 PC. It has been upgraded to 16GB RAM, 120GB SSD with 1GB spinner, but currently only uses the internal chip graphics (an Intel HD2000). I have been given a GT720 graphics card, and it states that it requires a 300W PSU. The HP PC comes with a 300W PSU, but it seems that the card is too much for it, as the PC just hangs. If I remove the card, it all works again. Could you recommend a PSU for this machine? I am happy with just a 400W one if you think that is enough. FYI, it has a Pegatron Corporation 2AB5 motherboard. You help would be appreciated.

**Richie**

*The minimum system power spec for the Nvidia Geforce GT720 is, indeed, 300W. You do have a 300W PSU, but this*

*also supplying power to the rest of your hardware, so the 300W the card apparently requires isn't actually being supplied. A 400W PSU would likely be okay, as long as the rest of your hardware doesn't require more than the extra 100W you'd get with the new unit. If you can stretch to it, it may be more suitable to go for at least a 500W model. These aren't that much more expensive these days, and the extra 200W you'd have to play with should be fine.*

*Also, don't forget to disable the on-board graphics in the*

*system BIOS, as this will save more power, and it would also remedy any possible problems you may have with the two GPUs conflicting. In fact, just to make sure you don't have a power problem at all, I'd do this first, before you buy a new PSU. Although the card needs a 300W as stated by the specification, it's worth a try if it could save money.*

▼ **More powerful graphics card require more power, so you may need to upgrade your power supply to compensate**



## No Need For GWX

I have a desktop and a laptop, both with Windows 7 64 bit (I downgraded the laptop from Windows 8.1)

I foolishly registered for the free upgrade to Windows 10 on both machines, but after reading the review in Micro Mart, I have decided to stick with Windows 7.

I removed the Windows 10 upgrade icon from the taskbar and hid the upgrade in Windows Upgrade, but it keeps reappearing in the optional upgrades and selected for installation automatically.

If I shut down Windows with upgrades indicated on the shutdown button in the Start menu, it would automatically install Windows 10.

I want to remove it permanently from the optional upgrades section of Windows update or at the very least stop it from being automatically selected.

Is there a registry edit for this?

**John**

*There is a registry tweak for this, but it's not really needed as you can achieve the same results far more easily. This involves simply uninstalling*

*the GWX Windows update, which handles the app for installing Windows 10.*

*To do this, go to Control Panel and go into Add/Remove Programs. Here, select View Installed Updates and look through the list for KB3035583. This is the Windows update for the GWX app. Highlight it and then uninstall it. Once it's gone, set your Windows updates to notify you of any update but let you decide if or when to install them. Ensure you don't install this optional update, and you're golden.*

▼ **The Get Windows 10 app isn't a welcome site for everybody. Luckily, you can uninstall it**





## Subconscious Repair

I think you may have given the answer to Harold's problem without realising it (MM1384). You made reference to Office and Outlook (2003, 2007, 2010), which got me to thinking. Harold mentioned that he had upgraded his laptop to Windows 7 in his letter, which would imply that it was previously Vista or even XP. That being the case, I feel pretty sure that he is running an earlier MS Office (maybe 2003), which is not supported under Windows 10. Perhaps his errant link is trying to open Outlook or Word 2003, which of course won't work but will work under Windows 7. Just a thought.

**Graham**

*You make a very good point, and I guess there is a possibility that an older installation of Outlook could be throwing a spanner in the works, especially if some default file associations or action are set to the older program. As Windows 10 only supports MS Office versions of 2007 and above, this would likely cause problems.*

*It would be wise for Harold (and anyone else with a similar problem) to check this and, if applicable, remove the older version of office from the system. This should iron out any possible problems caused by the older software and fix any potential associations.*

*Thanks for pointing that out, Graham.*



▲ Older versions of Office could cause problems for later versions of Windows

## BSOD Mystery

I have a self-built computer comprising of:

- MSI 990XA-GD55 main board.
- 3.33GHz AMD FX-8120 eight-core CPU.
- Sapphire HD 6850 graphics card.
- 16GB of matching memory.
- Five drives with a total of 8TB.
- 128GB SSD
- Windows 7 Ultimate.

Until recently, it worked perfectly for two years with the occasional clean, then the BSOD started to appear at random intervals of a couple of hours or a few days. After stripping the computer down, cleaning it and reseating all the components, I started it up and ran MemTest for two days solid. It found nothing wrong with the memory.

I even downloaded the latest drivers for my graphics card, as browsing the internet for help seemed to indicate a driver problem. I then ran four different virus checkers, but found no virus. The BSOD was still there at random intervals.

I then wiped all the drives and reinstalled Windows. I then ran the computer for a two-week period 24/7 without updates – no problem. I then allowed automatic updates; the problem was back. There are far too many updates to download each and then run the computer for a couple of days to see if that particular update is the problem.

I don't want Windows 10 at the moment, as I am halfway through

repairing over 100 mould-damaged photographs with the very expensive Adobe Photoshop, and it works on Windows 7. Where do I go from here?

**D Shaw**

*To give specific advice for this problem, I'd really need to know what the BSOD error message is. Without this, it's difficult to say what the problem could be, as it could be one problem from many possible causes.*

*However, as you seem to have narrowed it down to Windows updates, I'd try to remember when the problem first occurred. As the computer ran perfectly well for two years, only to then hit this BSOD wall, it's likely an update from after that period has caused the instability. This should narrow down the potential update causes, making it easier to use a little trial and error to track down the culprit.*

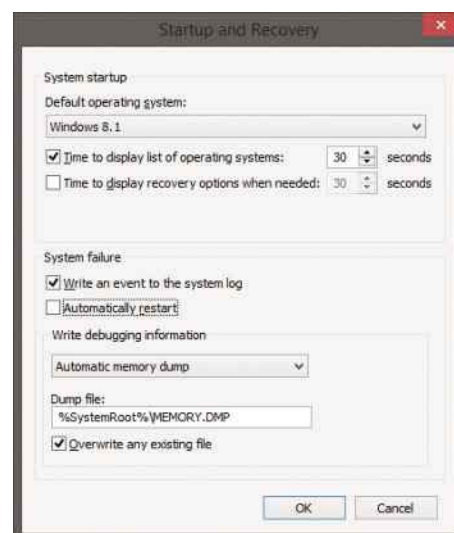
*Alternatively, after a new installation of Windows, ensure you choose the option to manually update Windows and only pick the critical updates. Update the system as much as you can and see if any of these critical updates cause the error. If not, you know it's going to be an optional update, which means the problem won't be as much trouble, because these updates aren't as critical.*

*If you do still get the BSOD, make sure you note down the actual error the BSOD gives you, as this will help pinpoint the*

*cause of the error. Of course, if you PC reboots as soon as this error pops up, this will be difficult, but this can be fixed.*

*To force the BSOD to stay on screen so you can actually read it, open Control Panel > System and Security > System and go into Advanced System Settings. Click the Advanced tab and then the Settings button under the Startup and Recovery section. Finally, uncheck the option to automatically restart under the system failure section. This will give you plenty of time to read the BSOD and find out what's going on.*

▼ Stop Windows from automatically restarting after an error, so you can read important error messages



# ASK JASON



**Meet Jason D'Allison, a veteran of Micro Mart's panel of experts. He's here to help with any technical questions, including anything to do with tablets or smartphones, as well as PCs**

Send your questions to:  
Jason D'Allison  
Micro Mart  
Dennis Publishing  
30 Cleveland Street  
London  
W1T 4JD

Contact Jason by email at:  
jason@micromart.co.uk

While we try to cover as many questions as we can, we regret that Jason cannot answer your questions personally, but he'll cover as many as he possibly can each week. Please ask one question per letter and remember to include the full specification of your computer, including its operating system.

*Jason*

## Who Goes There?

When I upgraded to Windows 10, I used my Microsoft account (my old Hotmail email address) for the login. Every time I switch the PC on, I now have to enter the password for this. I've tried to remove the password, but it seems this isn't allowed (perhaps I'd then be giving open access to my emails). In Windows 7, I didn't log in at all; the PC just went straight to the desktop. Is this not possible in Windows 10?

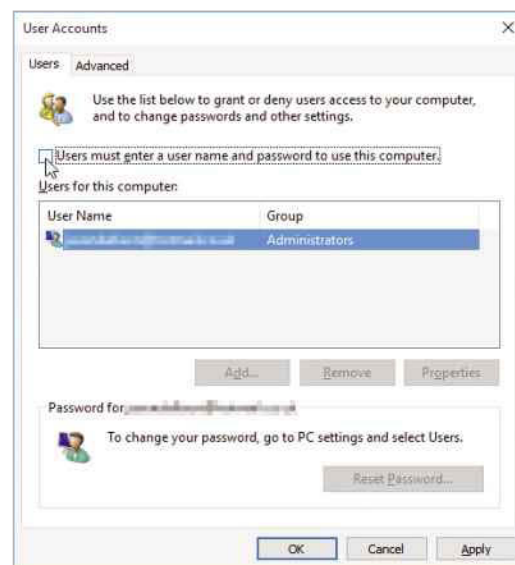
**Adrian, Lincolnshire**

*It's a pane in the glass, isn't it? Thankfully, it's easy to get round, though. Actually, the process is largely the same as it was in previous Windows versions. Take a look at this Micro Mart forum thread: [goo.gl/GW65Sm](http://goo.gl/GW65Sm).*

*To get started, Adrian, open up a command prompt. The easiest way to do that in Windows 10 is to type 'cmd' in the search bar and hit the return key (does anyone call it the return key any more?). At the prompt, type 'control userpasswords2' and hit the return key again. \* A dialogue box should heave into view. Select the relevant user account (you might only have the one) and untick the box labelled 'Users must enter a user name and password to use this computer.' Click OK. Job's a good 'un!*

\* You can also enter 'netplwiz', which will bring up exactly the same dialogue box. There was doubt in the mentioned forum thread over whether this would work in Windows 10's Home edition (the edition most people have, of course), but I can confirm that it does.

▼ **Why does Microsoft hide stuff like this?**



## The Big Freeze(R)

I'm building a new PC, the foundation of which is a Core i5-6600K and an Asus Z170-K. I want to try a bit of overclocking, and for the pocket-money price of £4 I've managed to acquire an Arctic Freezer Xtreme cooler. I was informed this would fit my setup (LGA 1151), but the pushpins don't seem to line up with the motherboard's mounting holes. Have I been sold a pup?

**Alex McLeod, TalkTalk**

*It sounds as though you've bought the original version of the Freezer Xtreme, not the newer one (usually identified as 'Rev. 2'). In terms of Intel sockets, this older unit only supports LGA 775. The motherboard mounting holes for LGA 775 are 72mm apart, but for LGA 1156, 1155, 1150 and 1151 they're 75mm apart. The spacing on the original Xtreme's retention frame is therefore slightly too small.*

*All's not lost, though, Alex. For £1.99, Arctic will sell you the retention frame for the newer Xtreme (the change in frame is the only real difference between the older and newer models). This one has elongated pushpin holes that'll fit over both the 72mm and 75mm motherboard spacing. The choker is that it's delivered from Germany, and the postage costs £4.46. Mind you, this would bring your total expenditure to just over a tenner, and as the retail price for the Xtreme is typically about £30, you've still bagged a bargain.*

*It's probably worth pointing out that the newer retention frame also supports LGA 1366, the Intel*

*server/enthusiast socket. The mount spacing for this is 80mm. It's also 80mm for the LGA 2011 series of sockets, but these use heavy-duty screws, not plastic pushpins, making most non-2011 coolers incompatible.*

*To round matters off, I'll also say that both versions of the Freezer Xtreme support all AMD sockets as far back as Socket 754 and Socket 940 – if we exclude the oddball Socket AM1, which appears to be dead. This is because the mounting-lug placement on the motherboard retention frames hasn't changed since 2003. Later sockets have six lugs, whereas older sockets have only two, but that seldom, if ever, causes problems. Hats off to AMD, I guess.*

▼ **An aftermarket cooler can often be coaxied into supporting sockets that didn't exist when it was released**





## Taken Into Account

I recently had to reinstall Windows 7 on my laptop, so I did a backup beforehand. However, I didn't bother backing up my Chrome data (bookmarks, passwords and so on), because I understood these were stored on Google's servers and would be automatically synced when I signed back into my Google account. Well, I'm signed in now (I can access my Gmail messages, for example), but my Chrome data seems to be completely missing. Any ideas?

**R Radbourne, Gmail**

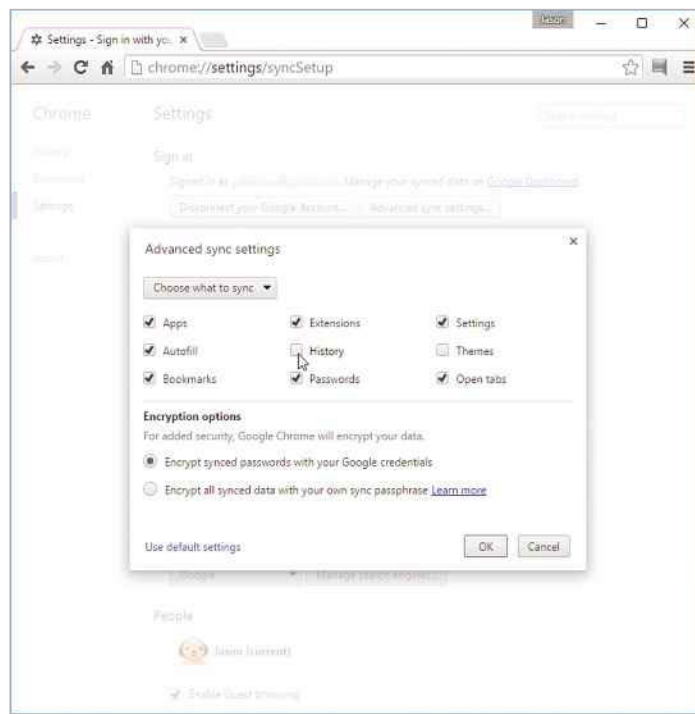
*You're signed into Gmail, but are you signed into Chrome? Signing into Gmail signs you into just that one Google service, but signing into Chrome signs you into \*all\* Google services (usually). It's like wearing a lanyard with a laminated pass stating 'Access All Areas'. Ordinarily, you'll remain signed in on a device even after a reboot, which is handy if not especially secure.*

*Look near Chrome's top-right corner. You should see your name next to the minimise button. If instead you see a generic avatar, click it to sign in. All bookmarks, passwords and so on will now be synced across any device you sign into – that's future data as well as data synced previously.<sup>†</sup> Of course, if signing into Chrome was something you rarely did or never did on your previous Windows installation, nothing will have been synced and you'll have lost the lot. Sorry about that.*

<sup>†</sup> To sync only certain things (bookmarks but not history or themes, say), click Chrome's burger menu (the icon featuring three horizontal lines), click Settings, then click 'Advanced sync

settings'. Select 'Choose what to sync' and untick the relevant boxes.

▼ **Google syncs everything by default, but it's easy to change this if you're not okay with that**



## Crossing The Channel

A while ago I bought a cheap little Bluetooth speaker for listening to music off my phone. It's impressive for its size but not especially loud, so I'm now looking to buy something more substantial – a sort of hi-fi replacement for the living-room. However, all the speakers on sale seem to be mono. Are there no stereo sets? Maybe Bluetooth doesn't support stereo?

**Dawid, Staffordshire**

*Music playback over Bluetooth uses A2DP (the Advanced Audio Distribution Profile). This does support stereo. Stereo speaker sets do therefore exist, but they're scarce. One issue is that most Bluetooth speakers are intended to be portable. They're small. Fitting two speakers in close proximity would be pointless, as there'd be no sound separation. The stereo channels would just mingle together to produce effectively a mono output. At any given price, most manufacturers have chosen to give buyers one good-quality speaker instead of two poorer-quality ones.*

*But what about speakers intended for living-room use, ones that would normally be placed far apart? I think the main issue here (please correct me if I'm wrong, dear readers!) is that Bluetooth devices have to be paired, with a master (your phone) and a slave (your speaker). A master can communicate with up to seven slaves, but not simultaneously. In a stereo setup with speakers that are physically separate, the master would need to send the left channel to one speaker and the right channel to another, and it could only do this by rapidly switching the signal between them. I'm not sure I'd want to hear the results.*

*The way round this is to have the second speaker linked to the first via a good old cable. The first speaker acts as the slave and keeps one channel for itself and spits the other down the cable. I believe this is how Bluetooth playback works in cars. It's not popular in the living room, though, Dawid, because if you need to have cables in play, what's the point of going wireless in the first place? Far better to buy a 'proper' hi-fi setup and shove a £10 A2DP receiver into the headphone or aux port.*

▼ **Devialet's Silver Phantom: 3000W, 105dB, £1,690, and... er... mono**



# Crowdfunding Corner

**Sometimes a product doesn't have to be new *and* improved – it can just be improved. This week, we've picked a couple of crowdfunded projects that aren't completely new, but which you might want anyway**

## UsBidi Intelligent Phone Charger

Phone chargers have become an essential part of daily life, so it's a bit surprising that they're not better. Much like the proverbial better mouse trap, an improved phone charger has enormous potential for success. At least, that's what the maker of UsBidi is gambling on.

Its new charger for iOS and Android devices aims to refine the technology to do away with the associated annoyances. As well as working as a data cable, it supports fast charging, can be switched off without being unplugged from the phone, will automatically deactivate itself when your phone is full, and has a built-in LED status indicator so you can see at a glance what the battery is doing without activating your phone screen.

The idea behind most of these features is to extend battery life by minimising heat and battery cycles, but the braided cable, extended length and magnetic connectors also aim to make the charger durable and convenient in its own right. You don't have to download any software to use it, and it fits into your existing charge sockets

You can get a UsBidi for just AUD \$26 (£17), which is more than £6 off the retail price. You get your choice of colour and interface, and you can pay more for extra chargers at a discount. The project's AUD \$35,000 goal seems more than likely to be reached, since there are 43 days to go and only AUD \$10,000 left to raise!

**URL: [kck.st/1hCLGKo](http://kck.st/1hCLGKo)**

**Funding Ends: Friday, 4th December 2015**



## SleepPhones Effortless

The SleepPhones consist of a headband with built-in headphones to help you get to sleep without getting tangled in wires or hurting your ears. They've proven a hit going back several years now, and the company that made them is planning a set of improvements funded through Kickstarter with the SleepPhones Effortless.

SleepPhones are made of soft, washable fabric and have built-in headphones, which sit comfortably over your ears while you sleep. The new Effortless version has wireless Bluetooth connectivity and a 13-hour rechargeable battery, which uses wireless induction for simplicity. There's even a small remote control so you can control the audio without picking up your phone. The company has already shifted half a million units, and the Effortless will be the fourth generation of its product, so it knows what it's doing!

Although there are different rewards at lower tiers, the cheapest way to get a set of SleepPhones Effortless headphones is to back the project for \$139 (£90). The package includes a pair of SleepPhones, the wireless charging base and postage to the UK. Again, multipacks are cheaper. The project's \$10,000 target has already been smashed, so it's essentially all go from this point on!

**URL: [kck.st/1L0n79B](http://kck.st/1L0n79B)**

**Funding Ends: Thursday, 19th November 2015**



**Disclaimer: Images shown may be prototypes and Micro Mart does not formally endorse or guarantee any of the projects listed. Back them at your own risk!**



# App Of The Week

## PicaPic's Retro Handheld Games Collection

### Handheld gaming has never looked so good

Since we've been looking at the Nintendo Game & Watch handhelds in our weekly Remembering page, we thought it was only fair to mention this wonderful resource of online Game & Watch goodness.

PicaPic's Retro Collection of Handheld Games is developed by Hipopotam, a small development studio from Warsaw, teamed by husband and wife Daniel and Aleksandra Mizieliński. Together they design a number of projects using Flash and HTML5, which include children's books, cookery books and retro gaming.

#### PicaPic

PicaPic (or, to use its full title, PicaPic's Hipopotam's Digitalised Collection of Handheld Electronic Games) is a wonderful look back into the days of the old Game & Watch handhelds. There are currently 27 faithful emulations available, with a promise to add more as the project develops further.

All you need to do is make sure you have the latest version of Flash installed, your browser is up to date and that you have several minutes to spare. Once all

that's in place, go to [www.pica-pic.com](http://www.pica-pic.com) and select your handheld machine from the horizontal scrolling list along the bottom of the screen.

To start with, you're given a brief detail on the make/model number of the unit, when it was first launched, where it was made and who developed it. Then, by clicking on the flip-up arrow, you can open up the handheld (if it's of the multi-screen variety), and by hovering the mouse over the screen, you'll see a play button appear. Moving the mouse will display the keyboard-related layout for the directional pad, along with any other buttons that you would normally find on the handheld. Most are of the W, A, S, D variety, so PC gamers will feel a little at home, but they're configurable by clicking on the associated key.

There are a few interesting extras that make this site that little more polished than just any old retro gaming resource. For one, the time on the Game & Watch units is synchronised with your local computer time. Secondly, when you press any of the corresponding keys, you see the buttons on the unit pressed. And

#### Features At A Glance

- Easy to use site.
- It's fun!
- It's free.

thirdly, the sound effects are accurately and lovingly reproduced according to the device you're playing with.

#### Very Nostalgic

If you're of a certain age, then you'll recall playing these handhelds, with their little LED screens and pocket-sized loveliness. You'll also be amazed at the attention to detail, on each of the playable units; it's quite astounding and deserves much praise. But the fun doesn't stop there. By navigating to the Hipopotam's home page ([www.hipopotamstudio.pl/#/en/stuff](http://www.hipopotamstudio.pl/#/en/stuff)), you can play full versions of *Defender*, *Squares* and *Typoroids*.

#### Conclusion

It's all about having a bit of fun during when you're bored or need a break from work. Plus you get to relive some old memories at the same time. In our opinion, it's well worth a visit.



▲ And now we rescue the ape from a moustachioed plumber



▲ Trying to thwart a nuclear attack in your tea break

# Logging Off

**O**ver the past couple of months, I've noticed a big push from UK banks to their customers, mostly in the form of TV advertising.

Are they promising not to play the US prime market like they're betting on horses again, or offering a return on investment that's marginally more than derisory? Neither.

They're spending their money promoting the products of the world's most successful company, Apple Inc. Actually, if it was RBS, it would be our money... technically.

Lots of things worry me about this, not least that Apple appears to be successfully cornering the market in cashless payments, which would effectively force people to have an Apple device to pay for things.

It's like someone in the 1950s suddenly decided that only Parker Pens could sign cheques, to the detriment of all other pen makers.

According to Apple's own information, it's connected the dots in the UK for American Express, Bank of Scotland, First Direct, Halifax, HSBC, Lloyds, M&S Bank, MBNA, Nationwide Building Society, NatWest, Royal Bank of Scotland, Santander and Ulster Bank. That doesn't leave many banks not included.

If you're wondering, there currently isn't a release date for Android Pay in the UK, though Google keeps saying it's coming (like Google Wallet was...) and not actually delivering anything.

With this significant headstart for Apple, banks falling over themselves to advertise its products for it and Google uncharacteristically disorganised, so much for the notion of a competitive market.

There is a potential pitfall in success, however, because if Apple Pay becomes the de facto contactless payment system in the EU, if it's not already, then legislation is very likely to come out of Brussels that would demand it offer it on other platforms.

And while Apple has a long and inspired history of just ignoring EU directives, like it did over phone charging standards, these ones might be much harder to brass.

But there's bad news to come. Apple could be forced to \$862 million in damages after it was found to have used technology patented by the University of Wisconsin in its phones and tablets. This is oddly the same patent that the Wisconsin Alumni Research Foundation (WARF) used to get Intel to spill coinage in 2008.

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The odd parallel here is that Intel tried then to have the WARF Patent reviewed by the US Patent and Trademark Office in an attempt to invalidate it, but it failed. Once that happened, Intel paid up to stop the imminent trial, but Apple ploughed on regardless, even after its approach to the patent office ended identically.

Worryingly for Apple, the current case it lost only covers devices that arrived before the A9 and A9X chips arrived, and WARF has launched a new infringement case covering the iPhone 6S and 6SPlus and also the iPad Pro.

Some have accused WARF of acting in a manner indistinguishable from a patent troll – something that Apple might consider as accurate.

However, it's the actions of Intel, Apple and others in the tech industry and the way they've harassed others based on ridiculously broad patents that has brought us to this place. After it tried in all seriousness to patent a rectangle with rounded corners, don't expect anyone to have much sympathy for Apple.

*Mark Pickavance*

## LAST WEEK'S CROSSWORD

**Across:** 7 Dimensionless, 8 Switch, 9 Ornery, 10 Igneous, 12 Skint, 14 Wacom, 16 Sprites, 19 Au Pair, 20 Invert, 22 Parkinson's Law.

**Down:** 1 View, 2 Mentee, 3 Isthmus, 4 Robot, 5 Planck, 6 Estrange, 11 Granular, 13 Apricot, 15 Opanka, 17 Invest, 18 Drone, 21 Roam.

### DISCLAIMER

The views expressed by contributors are not necessarily those of the publishers. Every care is taken to ensure that the contents of the magazine are accurate but the publishers cannot accept responsibility for errors. While reasonable care is taken when accepting advertisements, the publishers cannot accept any responsibility for any resulting unsatisfactory transactions. Forgive us for moaning about our first-world problems, but what is it with USB cables? More specifically, why is it that when you're looking for a mini-USB cable in your massive spaghetti-like tangle of leads you can only seem to find micro-USB ones (as well as proprietary chargers for phones you don't own any more,

SCART leads and broken 2.5mm audio cables)? And, of course, when you come back to that same mess of cables, looking for a micro-USB lead, they all suddenly do a runner and replace themselves with mini-USB ones. Where do the cables you actually want go? Well, the only logical conclusion is that they disappear to an alternate universe, so if you're looking for a micro-USB cable, then they go somewhere where there's another version of you, who's exactly the same but he or she is looking for a mini-USB lead instead. Of course, if you're both looking for the same type of lead at the same time, then they go into a kind of limbo, where they hang around with your lost socks and the backs of your remote controls.

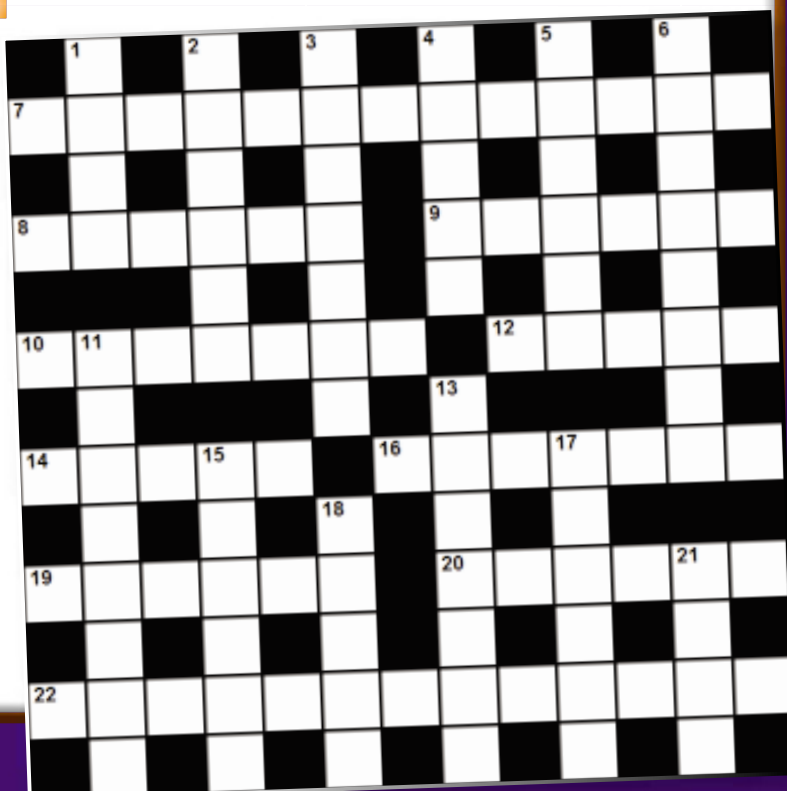
## THIS WEEK'S CROSSWORD

### Across

- 7 A detailed description of design criteria for a piece of work. (13)  
8 An engine running slowly while disconnected from a load or out of gear. (6)  
9 Discover the exact place or position of something. (6)  
10 Enables you to view, search for and change settings in Windows system registry. (7)  
12 A form of polyester resin used to make heat-resistant plastic films and sheets. (5)  
14 Analyse a string or text into logical syntactic components. (5)  
16 A collection of files on the internet under a common address and retrieved via a browser. (7)  
19 Announce as the result of an investigation, experience or finding. (6)  
20 .il TLD. (6)  
22 A figure indicating the relative price of shares on the Hong Kong stock exchange. (4,4,5)

### Down

- 1 A small electronic device manufactured by Apple for playing and storing digital audio files. (4)  
2 A person who copies out documents, especially one employed to do this before printing was invented. (6)  
3 Not using or depending on public utilities, especially the supply of electricity. (3-4)  
4 The ratio between the size of something and a representation of it. (5)  
5 Important forum post tagged to keep it in view above more recent general posts. (6)  
6 The range of optical density and tone on a photographic negative or print. (8)  
11 Expect a call from HMRC if you attempt to do this. (5,3)  
13 The aim of this computer game is simple: smush everyone and smash everything. You have a siege-engine-themed Lego box for the parts to build a whirligig of destruction. (7)  
15 A subordinate used by another to do unpleasant routine work. (6)  
17 A linear sequence of characters, words or other data. (6)  
18 Alloy of iron with small amounts of carbon. (5)  
21 Symmetrically arranged. (4)



# Top 5

# Scary Games

Seeing as it's Halloween, why not give your gaming a horror injection?

## 1 F.E.A.R.

If we've learned anything from horror fiction, it's that little ghost children can be one of the scariest things in the world, even though it's now something of a cliché. Taking more than a little inspiration from Japanese horror movies, F.E.A.R. used this idea to great effect, putting players in a tense, violent shooter, but also occasionally slowing things down a bit to ramp up the chills. As the series continues, the plot thickens, and things just keep on getting scarier. Definitely one to play this Halloween.

## 2 Dead Space

We imagine walking round a giant empty spaceship on your own would be daunting enough, but in the Dead Space series, you also have to contend with alien/human hybrid monsters, determined to separate your head from your neck and generally ensure you have a less than satisfactory day. Sure, you have a range of powerful mining tools to use as weapons, and you can slow down time, but these hybrids, known as Necromorphs (because they reanimate the dead bodies of their prey), have an annoying tendency to jump out of wall panels and down from ceilings. We'll be honest, it took us years to play the first game through to the end, partly because it kept crashing on us, but mainly because we just weren't brave enough.

## 3 Resident Evil

Although this series has become more action-oriented and, as a result, less frightening, the original instalments were truly terrifying. Not only did you have to contend with zombies, intent on chomping down on your lovely warm flesh, you also had to deal with the fact that resources, like weapons, ammo and medicine were extremely scarce. This made for a much more tense experience than you'd otherwise get. Plus you had to solve puzzles. That's like someone telling you that not only do you have to crawl through a swimming pool of spiders, but you'll also have to do the Times crossword on the way. Brilliant.

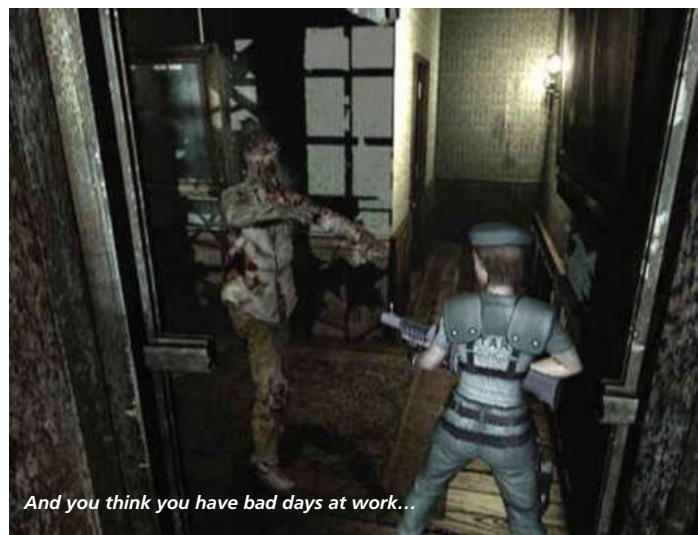
## 4 Silent Hill

Another hugely popular survival horror franchise, the Silent Hill games take a more supernatural approach than Resident Evil. Most of the games involve someone

looking for a loved one, but what they all have in common is the town of Silent Hill, which is almost certainly the worst holiday destination in the world. Here, deformed humanoid monsters lurch down darkened corridors, twitching uncontrollably towards you, intent on ending your existence. Oh, and to make matters worse, occasionally, a man with a head shaped like a giant pyramid tea bag will come after you with an impractically large blade, killing you if you get anywhere near him.

## 5 Alien Isolation

One of the things people loved the most about the original Alien movie, directed by Ridley Scott, was what you didn't see. The threat of the Xenomorph was far more frightening when you didn't know what it was or where it was hiding. This feeling of foreboding was arguably lost in the later instalments, but it's something that the game Alien Isolation tries to tap into once again. Most of the time, you find yourself up against other humans, which is scary enough, because you're totally outnumbered against heavily armed enemies. But the threat of the alien is always there too, and you know if it catches you, that it's game over. So if you're looking for a few frights come 31st October, turn down the lights, pump up the volume and enjoy the ride.





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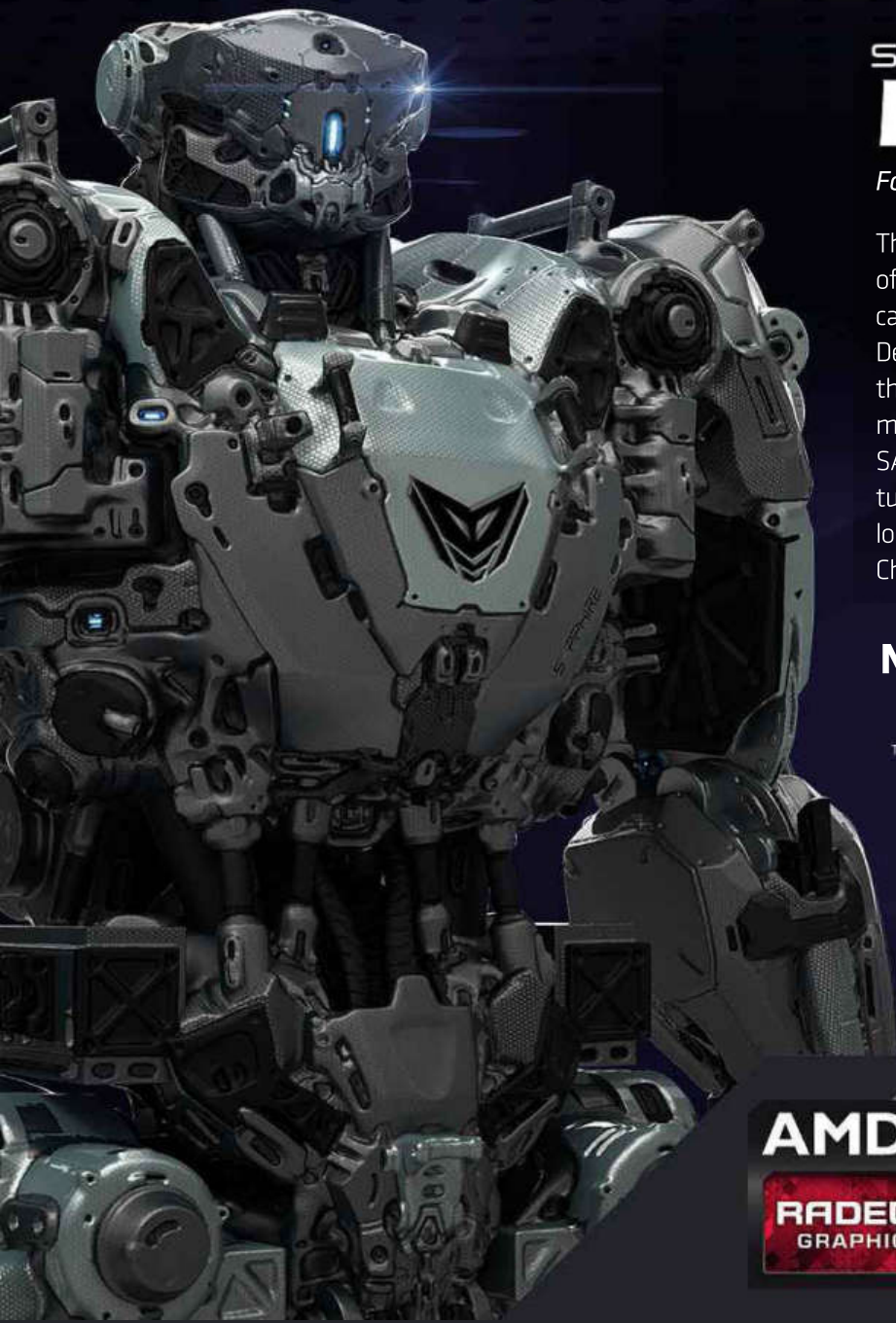
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